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ABSTRACT

A study entitled the Alternative Training Experiment (ATE) evaluated the effectiveness of a method for training census enumerators that involved new processes for developing instructional materials (called job performance aids) and new methods of instruction. During the study three pairs of census decentralized offices were matched on variables related to the difficulty of enumeration. Half the trainees from each office were given the experimental or Job-Performance-Aided (JPA) Training, while the remaining trainees were trained via conventional training methods. Based on enumerator reactions collected immediately after the training and again after two to three days of job experience, researchers found a slight but consistent preference for JPA training. A second study compared the job performance of the two groups of participants on a variety of performance measures. After analyzing data from end-of-training knowledge tests, self-report measures, and quality control records obtained as part of normal field operations, researchers decided that no conclusions about the effects of training on job performance were possible. However, they did make several recommendations concerning training development and research, including designing training packages with some flex time, and making the design of training and field manuals an integrated effort. (MN)

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ED216188

An Evaluation of the Use of Job Aids in 1980 Decennial Census Training

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Abstract

This report includes two memoranda which were prepared describing the results of an evaluation of the use of job aids in training for census enumerators. The enumerators were employed in the 1980 census to locate and interview households which failed to mail back their census questionnaire.

The first report describes comparisons among participants in two training approaches - one using job aids, the other using standard reference materials - on a variety of attitudinal and self-report measures. The second report compares the performance of the two groups of participants on a variety of performance measures collected following training. Moreover, recommendations for improving training are also included.

As noted in these memoranda, the data reported have not received the review and clearance normally associated with published census documents. The reports contain the opinions and recommendations of the author which should not be interpreted as positions of the Bureau of the Census.

Report Number 1

SUMMARY

Purpose

In response to criticisms of verbatim training, the Alternative Training Experiment (ATE) evaluated the effectiveness of a training approach for followup 1 enumerators - called Job-Performance-Aided Training - that required changes in both the process used to prepare training materials and the methods of instruction used to present those materials.

Unlike standard census training, the preparation of Job-Performance-Aided (JPA) training required that the same person prepare the enumerator field reference manual and accompanying training guide to accomplish the following specific objectives:

1. Exclude irrelevant or redundant information from the enumerator manual and, when possible, consolidate procedures.
2. Simplify the manual and the presentation of procedural information to improve access and comprehensibility.
3. Modify verbatim training so that known advantages could be realized, while introducing a variety of learning strategies to simplify training, increase trainee participation, and guarantee competency on a basic set of defined skills.

The overriding objective of this research, however, was to evaluate an approach to training which was low cost and could be easily adapted to known operational constraints in Bureau censuses and surveys.

Method

Three pairs of census decentralized district offices were matched on variables related to the difficulty of enumeration. Each office in a pair was then randomly assigned to one of the two training methods compared in this study; i.e., JPA or standard (control) census training. Measures of enumerator attitudes (reactions) toward the training were collected anonymously on two occasions; immediately after the conclusion of training and after 2-3 days of job experience. Standard census administrative records (e.g., Record of First Review, Record of Reinterview, Quality Control Enumerator Daily Progress Record, Employee Pay Voucher, and Crew Leader Record of Progress) were used to collect and develop enumerator performance and production indices.

Alternative (JPA) training materials were developed within the Bureau using existing facilities and distributed to participating district offices through the Jeffersonville processing center. A more detailed explanation of how JPA materials differed from standard enumerator-training materials is presented in the body of this paper, but, in general, the JPA training differed most notably in the process used to prepare materials, the followup 1 enumerator manual, the nature of activities used during training, stylistic variations attributable to presentation style (but not to a given training approach), and packaging of the materials.

Results

Only the reactions of enumerators on attitudinal measures are discussed in this memorandum, plus some supplemental findings dealing with an enumerator's fear of working in certain areas and suggestions for improving the enumerator's job. Production and performance indices, as well as recommendations for improving Bureau training, will be discussed in a followup memorandum.

The results indicated that large proportions of enumerators in both training approaches gave high ratings to their training on a variety of questions dealing with quality of the training, feelings of preparedness to perform enumerator activities, reading ease of training materials, and the adequacy of coverage of specific enumerator tasks during training. In itself, this finding contradicts widespread feelings that verbatim training is inherently disliked by participants, although it is necessary to caution that the control training used in this study may not be representative of verbatim training used in other census operations, and the high ratings might be influenced by factors other than training quality. In general, although the differences found were generally small as assessed by attitudinal measures, they consistently favored the JPA training and became more pronounced after job experience.

Overview of Paper

This paper presents a detailed discussion of the development and implementation of the Alternative Training Experiment. Accordingly, it was written for a diverse audience with disparate interests. To aid the reader in deciding which sections are most relevant, the following topical outline is presented:

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April 24, 1981

1980 Census

PRELIMINARY EVALUATION RESULTS MEMORANDUM NO. 9

Prepared by: William Mockovak, Center for Social Science Research

Subject: The Alternative Training Experiment: Design, Development, and Attitudinal Findings

Background

Census verbatim training, which requires a trainer to read word for word from a training guide, has been criticized in the past for being monotonous and insensitive to the needs of different groups of trainees and localities. Moreover, since verbatim training typically uses a great deal of lecture, it is open to the criticism that presenting a lecture to a group of trainees is no guarantee that they will either comprehend the lecture or be able to follow prescribed procedures once they begin working.

Recognizing these shortcomings of verbatim training, an effort was initiated in the Fall of 1978 to develop alternative methods of training census employees that would deal with the criticisms lodged against the use of verbatim training guides. As will be described more fully in later sections of this paper, a variety of alternative training approaches were considered, but only one was developed for experimental use in the 1980 Census. This research effort was one of six experimental programs that were conducted as part of the 1980 Decennial Census Evaluation and Research program.

Census Training

Census training is unique in many ways because it is constrained by factors not commonly found in most training settings. A list of these factors follows:

1. Most census jobs are short-term (2-4 weeks), which argues against the use of expensive or lengthy training sessions.

2. Applicants for census jobs vary widely in age, education, and experience; however, it is assumed that weak educational skills are the norm.

Note: The data in this report are preliminary and tentative in nature. Users of the results memoranda should understand that these documents are prepared for internal office use, with the aim of circulating information among Bureau staff members as quickly as possible. These memoranda, therefore, do not undergo the careful review and clearance normally associated with published census documents. Conclusions and recommendations contained herein essentially reflect the thoughts of certain staff members at a point in time, and should not be interpreted as statements of Bureau position.

3. Much of census training (e.g., for enumerators) is conducted in small groups (8-12 people), in marginal training facilities, and in literally thousands of training sites.

4. Training is almost always conducted by inexperienced trainers who received their training only 1-2 weeks prior to training sessions that they would lead.

5. Job manuals are an important reference source. Training is not designed so that workers will be able to perform all tasks on the basis of recall alone.

In the context of these previous constraints, the use of a verbatim training guide has several advantages. First, a verbatim guide helps ensure that the same information is presented to all trainees. Second, since the training quide is to be read word for word, inexperienced trainers can conduct the training session, assuming only that they can read intelligibly to a group of people. Third, verbatim training is a low-cost approach since it relies primarily on paper and pencil. Moreover, verbatim training writers are not required to have technical skills that might be required with the use of more sophisticated audiovisual or self-paced training techniques, although learning to write training that will be presented orally is a difficult skill to master. Finally, verbatim guides and accompanying materials pose few logistical problems in preparation or distribution. Certain types of audiovisuals, for example, might require long development times, be extremely costly if revisions are required, and require training rooms with specialized electrical outlets.

In the context of census training, other training alternatives have a difficult time matching the benefits of verbatim training, particularly in terms of costs. Accordingly, although a variety of instructional methods were considered as possible candidates for delivering census training, serious consideration was given only to approaches that emphasized the use of a "paper and pencil" technology and which, if successful in an experimental study, had a high probability of being used in future Bureau surveys or censuses.

Alternative Training Approaches: Material Development and Instructional Method

When comparing training approaches, a distinction should be made between the process used to prepare training materials and the instructional methods used to present them. For example, verbatim training is an instructional method which may, or may not, use other instructional methods, such as audiovisuals, television, audiotape, group discussions, role playing, etc. Moreover, there are a variety of competing models or approaches which could be used to develop the materials used in a verbatim training guide. Needless to say, if either the training materials development model or instructional method was faulty, ineffective training would likely result.

Training materials for the 1980 Census were prepared using what has generally been called the Instructional Systems Design (ISD) model. This model requires the following steps: (1) task analysis, (2) specification of training objectives, (3) design of instruction and development of learning activities, and (4) evaluation of the effectiveness of the training. The ISD model is currently the most respected and widely used model of instructional design because it introduces standardization and quality control into a process that, historically, has been almost totally subjective.

Job-Performance-Aided (JPA) Training

In the military services and industry, job reference manuals are an important source of information for successful job performance. Despite their importance, prior to the early 1950's relatively little attention had been paid to their design and the problems users encountered trying to access and comprehend procedural information. Over the past two decades, this problem has been studied, primarily by researchers in military technical training, who were interested in developing alternative formats and presentation methods for the paragraphs of prose descriptions so commonly found in technical manuals.

Initial work in this area focused on the development of job aids, which were defined simply as any device that helps a person perform a job task. Accordingly, although any manual is, itself, a job aid, developmental work emphasized the dual problems of access to and comprehensibility of procedural information. Psychological research discovered that varying formats - such as checklists, illustrations, schematic drawings, decision trees, algorithms (flow charts), and decision tables - improved human performance when compared to standard passages of prose materials. However, job aids are not limited to paper-and-pencil approaches. Microfiche, computers, and other devices have also been designed to aid performance in job tasks.

The theoretical rationale underlying the use of job aids is that they serve as repositories for procedural and factual information that does not have to be memorized by the trainee and, hence, covered extensively in training. Accordingly, training is simplified and usually shortened. Moreover, there is research evidence that job aids help less experienced personnel perform at levels comparable to the performance of more experienced workers.

Although job aids are the end product, they represent only the "tip of the iceberg" of the process used to produce them. Moreover, job aids can be, and have been, used with a variety of training methods.

The process of developing Job-Performance-Aided (JPA) training uses the ISD approach described earlier, but includes one critical improvement. Specifically, the JPA approach requires that the design of job reference manuals and training proceed concurrently. Probably the most immediate benefit of this requirement is that subject-matter experts and training designers must work together to identify job incumbent skills, clarify ambiguities in existing or proposed procedures, and to change procedures if limitations in training resources (time, money, or equipment) argue against their use. Other benefits include simpler manuals -- because some material that is covered in training can be excluded from the manual -- and simplified training. Training is simplified because a manual employing job aids can be used as a quide in group-learning exercises or as a self-instructional tool either in the classroom or in a self-instructional package.

Available research indicates that job aids and, concomitantly, JPA training are suitable for job areas where there are long and complex behavior sequences, many tasks exist that are rarely performed, "look-up" tables or charts are required, task performance benefits from the use of illustrations, and tasks can be mentally rehearsed before they are attempted. Census training, which emphasizes the use of manuals both in training and on the job and prescribes sometimes complex procedures to ensure standardized data collection, appears to be a suitable candidate for the extensive use of job aids.

Hypotheses

Based on previous research findings that studied the use of job aids, the experimental use of job aids in census training should result in the following:

1. Shorter, more simplified training.
2. Training quality at least equivalent to standard census training.
3. Training materials that are easier to use and comprehend.
4. Increased use of job reference manuals on the job immediately following training. (Only the period immediately following training is of interest. After this time, job experience and supervisory feedback should dramatically reduce the frequency of manual use.)
5. Better job performance by workers exposed to JPA training.
6. Absence of job performance differences between workers with and without prior experience working in the 1980 Census.

This memorandum will provide data relevant only to the first four hypotheses. A later memorandum will address the last two hypotheses and provide other performance data of interest.

Method

Initially, two alternative training methods were devised for comparison with standard census training. The second approach, called "abbreviated" training, replaced the verbatim training guide with a checklist of training activities and was planned to take a maximum of six training hours. Like the JPA training mentioned earlier, the abbreviated training also used job aids. However, only development of the JPA training with verbatim guides was continued because of poor trainee performance in a test and lack of time to revise the approach.

Selection of Job Area

Although a variety of census jobs were considered for the experimental test of JPA training, the followup 1 enumerator position was selected for the following reasons. It was the largest single job category in the census (preliminary estimates were that 150,000 persons would work as followup 1 enumerators); the followup 1 enumerator was required to use job reference manuals both in training and on the job; and the job involved numerous procedures, some of which were expected to be used only infrequently.

Experimental Design

The ideal design for this study would have been to use both training approaches (JPA and standard) in the same district office, resulting in a factorial design with training approach fully crossed with district office. Unfortunately, this design would have required random assignment of enumerators within a DO to training approach, two different sets of followup 1 enumerator training materials, two different sets of followup 1 crew leader training materials, and supervisors (i.e., Field Operations Assistants) to become familiar with both training approaches. Considering the hectic nature of census operations in DO's and the difficulty of controlling field experiments, it was decided that such a design was impractical.

Instead, using available demographic characteristics obtained in the 1970 Census, three pairs of decentralized census district offices were matched on variables thought to be related to the difficulty of enumeration (e.g., density of population, educational and income characteristics, etc. - see Appendix A for a comparison of the matched pairs of offices). The offices in each pair were then randomly assigned to one of the two training methods, resulting in three experimental and three control offices. Only one training approach was used in a given office. Moreover, only six DO's were included so that project control could be maximized.

Computations of power for this design (DO's nested under two training approaches), were calculated assuming that it was desirable to detect a difference of 0.05 in proportions for a dependent variable. These calculations indicated that there was a 96% probability of detecting a real difference between the training groups.

Only one type of office (decentralized) was included in the sample because followup 1 enumerator training differed only slightly between centralized and decentralized offices, and concern was expressed that centralized offices typically experienced operational problems which could contaminate any research findings.

Training Material Development

The distinction made earlier, between the process used to develop instructional materials and the method used to present those materials, is a critical one when comparing the experimental JPA training developed for this study with the standard (control) census training used for decentralized, followup 1 enumerators.

Both the standard and JPA training used verbatim guides and other instructional methods which it was felt would add variety, as well as accomplish specific objectives. For example, both training approaches used review exercises or performance checks throughout the training, workbooks, practice interviewing, training aids, other types of small group interactions, and the same set of audiovisuals. Moreover, the preparer of the JPA training and writers of the standard decennial training collaborated with each other and exchanged ideas about potentially effective training activities.

As a result of this exchange, the JPA training differed most significantly from the standard census training in:

1. The process used to design and develop training materials.
2. The enumerator job reference manual (the followup 1 enumerator manual was redesigned as a job aid manual).
3. The nature of the activities used during training (since activities using the job aid manual differed from comparable activities using the standard manual).
4. Stylistic variations attributable to different writers, not to a given training approach.
5. Packaging of the training materials (e.g., manuals, workbook, training aids, census forms, etc.).

Process of Preparing Training Materials: JPA vs Standard

The preparation of standard materials for followup 1 enumerator training can be summarized as follows:

1. Procedures were specified by subject-matter and operational divisions.
2. A manual writer in Field Division prepared a draft of a followup 1 enumerator manual.
3. Drafts of this manual were circulated to subject-matter and operational divisions and decennial training guide writers for comments.
4. Decennial writer(s), who were preparing verbatim training guides for followup 1 enumerators, worked from drafts of the manual or the final version and used the ISD model to design and develop their materials.

This process can be contrasted with the following which was used to produce the JPA training:

1. Procedures were specified by subject-matter and operational divisions.
2. A manual writer in Field Division prepared a draft of a followup 1 enumerator manual.
3. Drafts of this manual were circulated to subject-matter and operational divisions and the JPA training developer.
4. The JPA training writer redesigned the followup 1 enumerator manual and disseminated it for comments within the Bureau.
5. As the job aid manual was being developed, the JPA verbatim training guide for followup 1 enumerator training was also under development using the JPA model of instructional design.

Although step 2 above was included in the JPA process, it was only necessary because of the late starting date of this study. If the JPA process were to be implemented on a large scale in the Bureau, subject-matter experts would deliver their procedures directly to the job aid manual designer. Moreover, although one person designed both the job aid manual and the JPA verbatim training guide, it is conceivable that these tasks could be handled by more than one person if a formal planning process was implemented to insure communication between the involved parties.

Step 5 in the JPA process was especially critical because the concurrent development of the training guide and manual meant that "dry runs" or demonstrations of the training could generate suggested improvements in both the manual and training activities. By the time standard training "dry runs" were conducted, the design of the enumerator manual was complete and no substantive changes could be made.

Particularly with respect to the manual, it was important to determine if:

(1) Material could be accessed in a reasonable period of time?

(2) Once accessed, could it be comprehended?

(3) Did correct performance result if the material was comprehended?

This third criterion, although apparently ridiculous (If people can tell you how to do something, doesn't that mean they can do it?), was necessary because only properly designed training activities -- e.g., practice interviewing, completing forms, role playing through the steps of an interview, solving problems, etc. -- could demonstrate if, in fact, a trainee was able to successfully apply knowledge obtained in a manual.

Another benefit of working with draft copies of both the enumerator manual and verbatim training guide during "dry runs" was that unusally complicated or unrealistic procedures could be identified. Accordingly, different formats for presenting information in the manual could be used, or different training activities tried to insure that trainees left training with requisite skills and knowledge. Moreover, procedural changes, although bothersome, did not cause major problems because an attempt was made to modularize the JPA training; that is, major skills or concepts were taught using the following approach: introduce the topic, explain and demonstrate proper behavior, provide learning exercises, and provide feedback on performance.

In summary, the JPA process required that the design of the enumerator manual and verbatim training guide complement each other. Moreover, both the manual and training guide were tested, and revised as necessary, prior to use in the field. Although the standard enumerator training was also tested prior to use in the field, opportunities did not exist to change the enumerator manual even if it was discovered that trainees could not use it for certain tasks. Instead, the burden fell on the decennial writer to work around design deficiencies in the manual. In part, changes in the manual could not be made because of lack of time, but the manual review process also did not give decennial writers the authority to implement changes in the manuals which they thought would improve the quality and effectiveness of training.

Job Aid Manual

Preparation of the job aid manual started with a decision concerning which training objectives would be covered solely in training, in the manual, or in both places.

Although they are not mutually exclusive, the following quidelines were used.

Include in training, if the task:

1. is difficult to learn on the job;
2. is hard to communicate with words;
3. requires a great deal of practice;
4. allows little room for error or results in serious consequences if errors are made;
5. does not require exorbitant sums of money to train;
6. is performed frequently on the job:
7. does not allow time to reference a manual;
8. is performed by a large number of people in the job area.

Include in the manual, if the task:

1. has long and complex behavior sequences;
2. is rarely performed;
3. involves readings and tolerances;
4. can be mentally rehearsed before the need to perform it arises;
5. benefits from the presence of illustrations;
6. requires reference information (e.g., tables, graphs, flow charts schematics).

Job aids were then developed from prose descriptions of an enumerator's duties. Appendix B (page 32) presents a job aid (flowchart) that was developed for the situation where a nonresponse household was occupied, but the enumerator discovers that the respondent did not live in the housing unit on census day. Page i of Appendix B shows a copy of the page of the Table of Contents which the enumerator would have used to locate this information. The enumerator would have first looked in Section 3 (A Housing Unit Is Occupied) and, then, Section 3I for the relevant procedure to follow.

Page iii of Appendix B shows the equivalent page from the standard enumerator manual which would have been used to locate the procedure for this situation. In this case, the followup enumerator would first have had to look at Section 7 (How to Enumerate Nonresponse Cases) and, then, Section 7.B (Determining the Status of the Housing Unit). The specific situation causing problems for the enumerator is not directly identified in the Table of Contents.

Pages 52 and 53 of Appendix B are copies of the relevant section of 7.B. Subsection 7.B1.b (Housing Unit Occupied Entirely by Persons Who Did Not Live There on Census Day) describes the procedures to follow.

This comparison points out several distinguishing characteristics of a job aid manual. For example:

1. Problem situations encountered during field work can be readily identified in the Table of Contents, hence access to procedural information is improved.
2. Steps in a procedure are clearly identified, decision points are clear, and end products specified.
3. Steps in a procedure are presented in the same sequence that would be followed on the job.
4. Clear writing is emphasized. Action verbs are used, jargon is avoided, highlighting is used.

Using job aids to present procedural information, and excluding material from the manual which was covered in training, resulted in a 62-page JPA manual versus the 129-page standard manual.

Differences in Training Content, Stylistic Variations, and Packaging

Tests or "dry runs" of the JPA training guide indicated that it required approximately 25% less lecture time than the standard enumerator training, even though comparable material was covered. Further, since followup 1 enumerators were told that they would be paid for two days of training, it was decided to lengthen the JPA training by adding more workbook activities (approximately twice as many workbook exercises were used in the JPA training than in the standard training) and an end-of-training, remedial session for enumerators who failed to obtain a certain score on the JPA final-review exercise. Unlike the final review exercise used in the standard training, which was entirely multiple choice, the JPA final-review exercise required enumerators to fill out address labels, address listing pages, and "For Census Use Only" boxes from the questionnaires; use the job aid manual to solve possible field problems; and answer multiple-choice items. If an enumerator got more than a predetermined number of errors on this final exercise, the trainer was instructed to give the enumerator compensatory (remedial) classroom instruction. Compensatory classroom instruction was not a feature of the standard training. However, on-the-job training for enumerators who performed poorly during classroom training remained a part of both the JPA and control training.

Stylistic variations between the JPA and standard training guides reflected differences that tend to be unique to individual writers. The JPA verbatim guide was written in a more informal, colloquial manner and used significantly more trainer-directed questions than the standard guide (one question asked, on the average, every 176 words for the JPA guide vs one question every 293 words for the standard guide).

Finally, the JPA training packaged all the requisite training materials differently. Rather than assemble all the materials (workbook, manuals, training aids, blank forms, supplies) into a single large manila envelope, as was done in the standard training, the JPA materials were packaged in expandable portfolios. Further, each portfolio was subdivided into 13 sections, each with a simple name and numerical identifier. These names and numbers facilitated access to specific materials during the training and helped to lessen trainee feelings of disorganization and confusion so common at the start of any training session. Moreover, frequently used materials (e.g., manual, workbook, and certain training aids) were color-coded so that the trainer could say "Turn to page 10 in the green manual", instead of "Turn to page 10 in the Followup 1 Enumerator Manual, Form D-548".

It was estimated, assuming a production order of 100,000 training kits, that these packaging modifications increased the cost of each enumerator's training kit by approximately $1.40. This figure, however, does not include the cost of assembling the kits at a processing center. It is estimated that assembly time would double because of the sequencing required for the training materials.

Data Collection Procedures

Since this study was conducted in six different geographical locations, a full-time, data-capture clerk was trained in each office to coordinate the study, distribute and collect evaluation instruments, and deal with any problems that occurred. All of these individuals had previous census experience.

Two anonymous attitude questionnaires -- one given at the conclusion of training; the other after 2-3 days of work experience -- and an enumerator performance record were the major evaluation instruments. Each of these will be discussed more fully in the following sections.

Anonymous questionnaires were used because it was conjectured that enumerators would give more valid responses, particularly for questions that indirectly or directly reflected on the competence of their supervisor who was responsible for distributing and collecting the questionnaires.

Demographic data was not requested because it was felt that enumerators would not understand the reason such information was needed and, further, certain demographic variables (age and sex) cannot be legally used to select census enumerators for training purposes.

End-of-Training Questionnaire

A questionnaire was completed by each enumerator immediately at the conclusion of the training session to measure attitudes toward the quality and effectiveness of the training (See Appendix C). In addition, questions were asked about prior census experience (item 1, Appendix C) and type of training setting (item 3, Appendix C) so that prior experience could be controlled for in later analyses, and to determine the extent and length of on-the-job training that occurred.

On-the-job-training (OJT) for replacement enumerators was of special interest because in some district offices it was expected that replacement enumerators would comprise a large proportion of the work force and, in the JPA group, a more intensive type of on-the-job training was used. It was planned to be longer than the comparable training used in the control group and used more formal learning activities. Therefore, a comparison of enumerator reactions and performance was of interest. Unfortunately, although crew leaders were instructed to have replacement enumerators complete the end-of-training questionnaire after OJT, this instruction was followed so rarely that no meaningful analyses were possible.

Specific questions about preparedness, training length, quality, and reading ease of training materials were asked because each of these features could possibly reflect differences between JPA and standard census training. A more detailed question about specific parts of the enumerator job (item 8, Appendix C) was asked to determine if the training approaches differed in their adequacy of coverage of critical job skills.

A question about the value of different training activities in helping a trainee learn the enumerator job was asked to determine if the activities stressed in the JPA training (e.g., using the job aid manual and workbook) were actually perceived that way by trainees. Moreover, it was hoped that this question would provide feedback on the relative utility of different activities within a training approach. For example, some training specialists have argued for an increased use of audiovisuals in Bureau training. It was of interest to determine if audiovisuals were used more effectively in one training approach, as opposed to the other.

Post-Training Questionnaire

The post-training questionnaire (see Appendix D) was to be completed by each enumerator during "First Review" or earlier, if the enumerator was released for any reason. First Review was usually scheduled to occur 2-3 days after training and was a crew leader's initial examination of an enumerator's work. It included such things as reviewing entries in the Master Address Registers and edits of a sample of long and short census questionnaires.

First Review was also the point beyond which performance differences between training approaches were expected to wash out because, if an enumerator's performance was found to be inadequate, the crew leader was supposed to give the enumerator on-the-job-training to deal with the problems.

The primary purpose of the post-training questionnaire was to determine if an enumerator's work experience significantly changed attitudes obtained on the end-of-training questionnaire. For example, an enumerator might have rated a training approach highly immediately after training, but changed his/her opinion after encountering the realities of the job. In addition, a question (item 8, Appendix D) was also asked about the frequency of use of the enumerator manual (or job aid manual) and the Questionnaire Reference Book (QRB). Although the QRB was not redesigned to be a job aid manual, it was still considered of interest to determine how often the QRB was used. Also, since obtaining observational data to estimate the frequency of manual use was not practical, a self-reported answer was the only way available to obtain these data.

Other questions (items 6 and 7) on the post-training questionnaire attempted to measure indirectly the effectiveness of the JPA training. Item 10 dealt with a list of suggested improvements that enumerators were asked to respond to. And item 11 dealt with an issue that may affect data-collection procedures in future censuses and surveys; that is, enumerator fear of working in certain neighborhoods. Finally, item 12 sought to determine the employment status of census employees in the participating district offices. Again, this information might be of importance in planning future censuses.

Enumerator Performance Record

Data-capture clerks in the district offices were instructed to complete a performance record (see Appendix E) for each person trained to be a followup 1 enumerator. The data from this form will be reported in the next memorandum in this PERM series.

Data Collection Problems

Training was scheduled to be conducted at the same time (April 14-15, 1980) for all enumerators, but unexpected field problems caused delays of as much as a week in certain offices (see Appendix A for a detailed breakdown of training dates for each district office).

Since the primary job of a followup 1 enumerator was to obtain census information for households that failed to mail back a census questionnaire, this particular position was expected to last only 3-4 weeks. In some offices (New York City area), however, this time period approached three months.

All enumerators were also supposed to be paid piece-rate for each questionnaire completed, but field problems resulted in all offices paying some of their enumerators an hourly wage instead. A variation in pay is important because it could affect attrition and attitudes toward the enumerator job, regardless of training.

Table 1 shows the percentages of end-of-training and post-training questionnaires (100% sample was used) that were returned from the JPA and control (standard training) offices.

TABLE 1

Percentage of Evaluation Instruments Returned

DATA	JPA	CONTROL
End-of-training attitude questionnaire (D-859)	97.6	79.5 1/
Post-training (after 2-3 days of job experience) attitude questionnaire (D-860)	77.9	40.3 1/

1/ An unknown number of these forms were reportedly lost in the mail

Despite the fact that some instruments were lost in a mail transmittal from one control office (a maximum of 15% of the total number of forms in the control group were lost) return rates for all the evaluation measures were still lower in the control offices. Although it is not possible to say with certainty why these differences occurred, interactions with the data-collection clerks indicated that clerks in the JPA offices were more successful in establishing good working relationships with field personnel so that materials were more efficiently distributed and returned.

One possible explanation for better working relationships was simply better clerks, but there were also indications that a "Hawthorne" effect was operating for supervisors. Field Operations Assistants (FOA's) in the JPA offices trained both with standard census materials and the JPA materials, whereas FOA's in the control offices saw no real differences in procedures, except for the added work of additional evaluation forms. Further, FOA's from one JPA office who were asked to compare the JPA and standard training approaches expressed a decided preference for the JPA training. Therefore, although all participating offices were visited by Bureau observers and knew that they were part of an experimental study, supervisors in the JPA offices might have exerted more effort in helping the data-collection clerks collect evaluation measures.

If, in fact, the preceding did occur for FOA's in the JPA offices, there may be reason to suspect systematic bias in the return of the post-training attitude questionnaire and administrative records used to complete the enumerator performance record. This bias would result from FOA's exerting more effort to obtain forms from possibly marginal or unmotivated crew leaders. Unmotivated crew leaders could conceivably have a detrimental effect on both enumerator attitudes and performance. Conversely, motivated crew leaders who conscientiously performed their duties and returned their evaluation and administrative records, could be expected to influence positively their crews and production measures.

Although the possibility of a systematic bias cannot be discounted, particularly for the post-training questionnaire and enumerator performance record, it does not seem likely that a "Hawthorne" effect, or other systematic bias, affected the results of the end-of-training enumerator questionnaire. Enumerators (except those with prior census experience) saw only one type of training and completed the questionnaire immediately after training. Moreover, no special attention was paid to enumerators in either the JPA or control offices.

Another possible confounding factor in this study was the presence of unexpected, and severe, field problems in the district offices. Field problems (particularly problems with address registers) were a major cause for concern in all the district offices participating in this study but, again, it cannot be said with certainty whether they were worse in one type of office, as opposed to the other. This issue will be discussed more fully later in this paper and in the second memorandum in this PERM series which will discuss performance measures.

RESULTS

One view of the importance of enumerator training is that it affects an enumerator's attitudes toward the census and his/her job and, therefore, might contribute to poor performance or attrition. It has even been conjectured that training quality might affect attrition rates during training.

Table 2 below shows that the training groups compared in this study did not have significantly different rates of enumerator attrition during training.

TABLE 2

Percentage of Enumerators Completing Followup 1 Enumerator Training

		(N=1,197) JPA	(N=1,389) Control
Finish Training?	Yes	98.3	97.1
	No	1.7	2.9

A critical outcome of any training is how prepared a trainee feels to perform assigned duties. Low levels of self-confidence existing at the start of a job might result in poor performance, more supervision, more on-the-job-training, or higher rates of attrition. Further, although feelings of preparedness at the end of training are important, such feelings after job experience are a more valid measure of the training's effectiveness since the enumerator's concrete experiences provide a more valid basis for judging the adequacy of training.

Table 3 presents the responses of enumerators to questions about preparedness on the end-of-training and post-training questionnaires. In this analysis and subsequent ones comparing end-of-training with post-training responses, it was assumed that missing questionnaires were randomly distributed in both groups and that field problems or other factors (e.g., supervision) did not differ significantly between the groups.

TABLE 3

Enumerators' Self-Ratings of Degree of Preparedness

Question: "How well prepared do you feel (were you) to go out and work as an enumerator?"

	End-of-training		Post-training	
	a. N=1,158	b. N=1,085	c. N=919	d. N=557
	JPA	Control	JPA	Control
Well Prepared	47.8%	48.2%	60.8%	54.8%
Adequately prepared	51.6	50.1	38.0	42.7
Poorly prepared	0.6	1.6	1.0	2.3
Not prepared	0.0	0.1	0.2	0.2

Most enumerators in both training approaches, and on both occasions, reported that they had been "adequately" or "well prepared" for their jobs. The marginal association between degree of preparedness and type of training at the end-of-training (i.e., between columns a. and b.) was not significant ($\chi^2 = 6.15$, 3 df, $p = 0.1$), but it was significant ($\chi^2 = 8.45$, 3 df, $p = 0.04$) for the post- training comparison (i.e., between columns c. and d.).

To test whether or not reported feelings of preparedness changed differentially between training approaches after job experience, the partial association of factors in Table 3 were tested using a log-linear model analysis available in the Biomedical Computer Programs P- Series (BMDP-77) statistical package.[1] To do this analysis, random patterns of nonresponse were assumed for both the end-of-training and post-training questionnaire. Further, it was assumed that field problems and supervisory practices did not differ between the JPA and control groups.

The best-fit model included all 2-way interactions, but not the 3-way interaction. The presence of a 3-way interaction would have indicated that response patterns for the JPA and control groups differed depending on the time of measurement. Or, in other words, job experience would have significantly changed the response patterns found on the end-of-training questionnaire.

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[1] Brown, M.B. (Ed.) BMDP Biomedical Computer Programs P-Series 1977. Berkeley, CA: University of California Press, 1977.

A similar question about feelings of job preparedness was asked on an attitude questionnaire used in the 1970 Enumerator Variance Study.[1] Although a sample of 1,058 decentralized followup enumerators completed this questionnaire, differences in training content (followup enumerators performed some different tasks in 1970), question wording, and time of administration (it was completed when an enumerator either completed his/her assignment or quit) preclude any definitive comparisons. Still, the results in Table 3A suggest that both the JPA and standard 1980 followup training might have done a better job of preparing enumerators for their jobs.

TABLE 3A

Enumerators' Ratings of Training Adequacy in the 1970
Enumerator Variance Study

Question: "How well did you understand your job when you began? That is, how adequately did your training prepare you for the job?"

Response	Percent
Definitely adequate	40.9
Just about adequate	45.7
Not quite adequate	10.0
Definitely not adequate	3.4

Table 3B in Appendix F shows the responses of the matched pairs of offices to the questions about preparedness. Table 3C (Appendix F) presents chi-square comparisons for the three pairs of offices.

For the end-of-training questionnaire, the pattern in Table 3 for the "well" and "adequately prepared" categories is repeated in Table 3B for the first two office pairs; however, the percentage differences are larger. The third pair runs counter to this trend, with the S. Dayton office giving proportionally more "well prepared" ratings. The pattern in Table 3 for the "poorly" or "not prepared" categories is the same as that in Table 3B.

For the post-training questionnaire, the pattern in Table 3 for the "well" and "adequately prepared" categories is repeated in Table 3B, with the exception of the "adequately prepared" category for the first office pair.

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[1] Inderfurth, Gail. Results from the 1970 Enumerator Variance Study Post-Enumeration Questionnaire. E18 No. 40

The pattern in Table 3 for the "poorly" or "not prepared" categories is repeated in Table 3B for the first two office pairs; however, the third pair runs counter to this trend with slightly more S. Dayton enumerators reporting that they were "poorly prepared."

To determine if there was any significant within-office variation on the preparedness question as a function of experience, the 4-category response scale was collapsed into two categories--prepared or not prepared. Table 3D in Appendix F presents the results of chi-square tests computed for each office. Only the responses in one office (S. Dayton) changed significantly, but the change was not of practical significance since 98.1% of the enumerators on the post-training questionnaire reported that they felt prepared versus 99.8% on the end-of-training questionnaire.

It has been argued in some of the research that studied the use of JPA's that less experienced personnel using job aids were able to perform at levels of proficiency comparable to persons with more job experience. Although asking about job preparedness is obviously not the same thing as measuring actual performance, it can be conjectured that enumerators who differed in prior census experience would not differ in their feelings of job preparedness after JPA training, but that they would differ after standard census training. The same relationship would also hold for the post-training questionnaire results.

Table 4 presents a breakdown of Table 3 controlling for prior census experience. It is apparent in Table 4 that just the opposite of the preceding hypothesis was true for JPA-trained enumerators on the end-of-training questionnaire. That is, comparing columns a. and d., 60% of JPA enumerators with prior census experience felt that they were "well prepared" versus 46.1% of the JPA enumerators with no prior experience. Moreover, no JPA enumerators with prior census experience reported that they felt "poorly" or "not prepared". The response patterns in columns a. and d. differ significantly (see Table 5). The response differences on the post-training questionnaire were not statistically different.

Again, contrary to the hypothesis for the control enumerators, there were no statistically significant differences, controlling for experience, on either questionnaire.

The results in Table 4 suggest that JPA enumerators with prior census experience reacted more positively to their training than control enumerators with prior census experience. For example, looking at only the "No Prior Experience" subsections of Table 4; it is apparent that the pattern of results closely approximates that found in Table 3. However, especially for the end-of-training comparison, just the opposite is true for the "Prior Experience" subsections. In contrast to Table 3, proportionally more JPA enumerators with prior experience, than control enumerators with prior experience, marked the "well prepared" response, although these differences were not significant (see Table 6).

TABLE 4

Ratings of Degree of Preparedness Based on Prior Census Experience

Question Pre: "How well prepared do you feel to go out and work as an enumerator?"

Post: "How well prepared were you to go out and work as an enumerator?"

End-of-Training

	Prior Experience			No Prior Experience		
	(145) JPA a.	(188) Control b.	(333) Overall c.	(1013) JPA d.	(895) Control e.	(1908) Overall f.
Well prepared	60.0%	53.2%	56.2%	46.1%	47.2%	46.6%
Adequately prepared	40.0	46.3	43.5	53.2	50.9	52.1
Poorly prepared	0.0	0.5	0.3	0.7	1.8	1.2
Not prepared	0.0	0.0	0.0	0.0	0.1	0.1

Post-Training

	Prior Experience			No Prior Experience		
	(106) JPA	(105) Control	(211) Overall	(813) JPA	(452) Control	(1265) Overall
Well prepared	66.0%	58.1%	62.1%	60.1%	54.0%	57.9%
Adequately prepared	32.1	37.1	34.6	38.7	44.0	40.6
Poorly prepared	1.9	3.8	2.8	0.9	2.0	1.3
Not prepared	0.0	1.0	0.5	0.2	0.0	0.2

NOTE: Base for percentages is reported in parentheses above group designation.

TABLE 5

Chi-Square Statistics for JPA and Control Groups Controlling for Prior Census Experience

	End-of-Training		Post-Training	
	X^2	P	X^2	P
JPA (Cols. a. vs d.)	10.4	.01	2.9	.41
Control (Cols. b. vs e.)	3.6	.31	6.7	.31
Overall (Cols. c. vs f.)	11.9	.01	6.1	.11

NOTE: All comparisons are based on 3 degrees of freedom.

TABLE 6

Chi-Square Statistics for JPA vs Control Groups for End-of-Training and Post-Training

	Prior Experience		No Prior Experience	
	X^2	P	X^2	P
End-of-Training	2.2	.33	6.5	.09
Post-Training	2.6	.45	7.9	.05

NOTE: All comparisons are based on 3 degrees of freedom.

Another hypothesis was that JPA training would be more highly rated in terms of quality because the enumerator manual and training were designed to complement each other, the training was simplified, and more feedback (in the form of workbook activities and trainer questions) was provided to enumerators so that they could concretely evaluate what they did or did not know.[1]

Table 7 presents the responses of enumerators to questions about the quality of training on the end-of-training and post-training questionnaires.

TABLE 7

Enumerators' Ratings of Quality of Training

	End-of-training		Post-training	
	a. N=1,163	b. N=1,093	c. N=887	d. N=526
	JPA	Control	JPA	Control
Very Good	57.0%	49.0%	58.7%	44.9%
Good	37.8	42.1	37.1	46.6
Fair	4.5	8.3	3.0	8.0
Poor	0.7	0.5	1.1	0.6

Most enumerators in both training approaches, and on both occasions, reported the quality of the training to be "good" or "very good". However, proportionally more "very good" ratings resulted in the JPA group. The marginal association between quality and type of training group was significant for both the end-of-training (x^2 = 22.7, 3 df, p=0.00) and the post-training comparisons (x^2 = 36.8, 3 df, p =0.00).

Table 7A in Appendix F shows the response patterns of the matched pairs of district offices to the question about quality. Table 7B (Appendix F) presents chi-square comparisons for the three pairs of offices.

For the end-of-training questionnaire, the pattern in Table 7 for the "good" and "very good" categories holds for the second and third office pairs in Table 7A. The first pair runs counter to this trend with the S.W. Brooklyn office giving proportionally more "very good" ratings. The pattern in Table 7 for the "fair" and "poor" categories is repeated in Table 7A, except for the third office pair where there is a slight deviation.

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[1] Feedback about performance has been shown to be a powerful, and positive, influence on learning.

TABLE 8

Ratings of Quality of Training Based on Prior Census Experience

Question: "Overall, how would you rate the quality of the training?"

End-of-Training

	Prior Experience			No Prior Experience		
	(145) JPA a.	(188) Control b.	(333) Overall c.	(1018) JPA d.	(903) Control e.	(1921) Overall f.
Very Good	62.8%	47.9%	54.4%	56.2%	49.3%	52.9%
Good	32.4	44.7	39.3	38.8	41.5	40.0
Fair	4.8	7.4	6.3	4.4	8.5	6.4
Poor	0.0	0.0	0.0	0.8	0.7	0.7

Post-Training

	Prior Experience			No Prior Experience		
	(98) JPA	(100) Control	(198) Overall	(784) JPA	(426) Control	(1210) Overall
Very Good	69.4%	45.0%	57.1%	57.4%	44.8%	53.0%
Good	25.5	41.0	33.3	38.5	47.9	41.8
Fair	3.1	13.0	8.1	3.1	6.8	4.4
Poor	2.0	1.0	1.5	1.0	0.5	0.8

NOTE: Base for percentages is reported in parentheses above group designation.

Table 9

Chi-Square Statistics for JPA and Control Groups Controlling for Prior Census Experience

	End-of-Training		Post-Training	
	X^2	P	X^2	P
JPA (Cols. a. with d.)	3.4	.33	6.9	.07
Control (Cols. b. with e.)	1.9	.59	5.1	.16
Overall (Cols. c. with f.)	2.6	.46	9.2	.03

NOTE: All comparisons are based on 3 degrees of freedom

TABLE 10

Chi-Square Statistics for JPA vs Control Group for End-of-Training and Post-Training

	Prior Experience		No Prior Experience	
	X^2	P	X^2	P
End-of-Training	7.4	.03	18.1	.00
Post-Training	15.1	.00	23.9	.00

NOTE: All comparisons are based on 3 degrees of freedom.

For the post-training questionnaire, the patterns for all response categories in Table 7 are repeated in Table 7A, except for the first pair where there are slight deviations for the "Good" and "Poor" categories.

To determine if there was any significant within-office variation on the question about training quality, the 4-category response scale was collapsed into two categories--acceptable and unacceptable. Table 7C in Appendix F presents the results of chi-square tests computed for each office. None of the comparisons were significant.

Although there are no findings in the research literature which would predict how more experienced personnel would rate the quality of JPA training, it can be conjectured that JPA-trained enumerators with prior census experience would give higher ratings of quality to JPA training than JPA-trained enumerators without prior experience since they would have previous census training as a standard for comparison. This outcome should not occur for control enumerators, unless the standard (control) training used in this study also deviated qualitatively from typical census training packages.

To test this hypothesis, chi-square statistics were computed (see Table 9) for each group (JPA and control) controlling for prior census experience. Neither one of the comparisons was significant at a .05 significance level.

Again, looking at just those groups with no prior census experience in Table 8, the response pattern obtained closely approximates that found in Table 7. This is not the case, however, for groups with prior census experience. Proportionally more JPA-trained enumerators with prior experience gave "very good" ratings to their training than their control counterparts with prior experience. Both of these comparisons were statistically significant (see Table 10).

A major argument for using job aids in training and manual design was that they simplified the presentation of procedural information and improved comprehensibility. Accordingly, a question (on the end-of-training questionnaire only) asked whether training materials were easy to read and understand. Table 11 presents the responses to this question.

TABLE 11

Enumerators' Ratings of Training Materials Comprehensibility

Question: "Were the training materials easy to read and understand?"

	N=1,150 JPA	N=1,080 Control
Yes	95.8%	90.7%
No	4.2	9.3%

The training materials in both approaches were judged easy to read and understand, but the JPA approach elicited a small, but significantly higher rating ($\chi^2 = 23.4$, 1 df, p = .00).

Table 11A presents the responses of enumerators to a similar question that was asked on the questionnaire used in the 1970 Enumerator Variance Study. That question, however, referred only to the descriptions and directions in the enumerator's handbook (manual) so, as before, any differences are only suggestive.

TABLE 11A

Enumerators' Ratings of Handbook (Manual) in the 1970 Enumerator Variance Study

Question: "Did you think the descriptions and directions in the enumerator's handbook were--"

Response	Percent
Very clear	31.1
Mostly clear	51.7
Somewhat confusing	14.0
Very confusing	3.2

One criticism made against the use of verbatim training is that it can easily slip into monotony, and trainees frequently complain about training sessions that are too long.

JPA training using verbatim guides was designed specifically to be activity oriented, provide a variety of learning activities, and require active participation by each enumerator. Accordingly, it was conjectured that JPA-verbatim training would be perceived as more acceptable in length than the control-verbatim training. A question that asked directly about the length of training was asked on the end-of-training questionnaire and the results are presented in Table 12.

TABLE 12

Enumerators' Ratings of Length of Training

Question: "Was the length of training..."

	N = 1,162 JPA	N = 1,088 Control
Too Short	12.1%	15.1%
About Right	81.0	72.5
Too Long	6.9	12.4

It is apparent in Table 12 that proportionally more enumerators rated the JPA training as acceptable in length ($\chi^2 = 26.8$, 2 df, $p = 0.00$).

Table 12A presents the results of a similar question that was asked in the 1970 Enumerator Variance Study. As before--because of differences in training, content, time during the followup period that the question was asked, and variations in question wording--differences in response are only suggestive, but it appears that the lengths of both training approaches investigated in this study were more acceptable than in 1970.

TABLE 12A

Enumerators' Ratings of Length of Training in the 1970 Enumerator Variance Study

Question: "Did you think the amount of time you spent in training to be an enumerator was"

Response	Percent
Too long	10.1
A little too long	21.9
Just right	37.8
A little too short	22.8
Too short	7.4

In a previous analysis that dealt with enumerator feelings of preparedness before and after job experience, it was conjectured that the self-confidence an enumerator felt in approaching a job was important because it could affect performance, the amount of supervision or on-the-job training required, and attrition. Although that analysis dealt with general feelings of preparedness, it was equally important to determine enumerator self-confidence about specific job tasks since these could be linked more directly to differences in training approaches. For example, the JPA training stressed using the job aid manual and dealing with unusual situations. Moreover, it included more and different learning activities dealing with completing payroll forms, questionnaires, and address registers. Further, it was more pessimistic about the possible cooperation of respondents during followup 1. On the other hand, the control training required more practice interviewing. Accordingly, differences between the JPA and control training in enumerator perceptions could be expected on these dimensions.

On the end-of-training and post-training questionnaires, enumerators were asked to check tasks that they thought would cause some problems (end-of-training) or were not covered well enough (post-training) in training. Table 13 lists the major tasks in an enumerator's job and shows the percentage of JPA or control enumerators who checked tasks on either questionnaire.

TABLE 13

Enumerator-Identified "Problem" Job Tasks

	End-of-Training (Expecting Difficulties)		Post-Training (Not covered Well Enough in Training)	
	N = 1,168	N = 1,097	N = 932	N = 560
TASK	JPA	Control	JPA	Control
Locating addresses	8.0%	6.9%	8.3%	9.5%
Interviewing people	11.6	9.1	6.9	6.8
Completing the questionnaire	7.7*	5.6*	5.2*	8.9*
Completing the address register	4.6	6.0	4.6*	9.1*
Filling out payroll forms	8.2*	14.9*	11.3*	15.7*
Using the job reference manuals	5.1*	9.2*	4.4*	8.6*
Getting people to cooperate	49.4*	36.9*	14.7*	20.7*
Dealing with unusual situations	42.6	39.1	17.8*	28.0*
Answering respondent questions	10.4	10.8	6.9	8.4
Checking for missed housing units	19.4	18.6	12.7	15.5

*Indicates that chi-square statistic (JPA vs Control) is significant, p< .05, 1 df.

Known differences between the JPA and control training apparently affected enumerator perceptions of the tasks that they expected to have difficulty with at the conclusion of training. For example, in JPA training, which was more pessimistic than the control training about respondent cooperation, enumerators expected more difficulty getting people to cooperate. Further, they expected fewer problems using job reference manuals and filling out payroll forms. However, they expected more problems completing the questionnaires (i.e., filling in address labels, "For Census Use Only" box, back page, population and housing items).1/

1/ On some of the tasks in Table 13, for example, interviewing people and dealing with unusual situations (end-of-training), larger percent differences between the JPA and control groups were not significant because using the chi-square statistic, variability was greater.

On the post-training questionnaire, however, all these differences favored the JPA training, plus dealing with unusual situations and completing the address registers became statistically significant differences.

As with previous analyses, the effect of prior census experience on an enumerator's self-confidence in performing job tasks is of interest. It can be conjectured that JPA trained enumerators, whether or not they had prior census experience, would not differ in either their expectations of expected job problems or their opinions about which tasks needed more coverage in training. On the contrary, it was expected that control enumerators, with and without prior experience, would differ significantly in their reactions because of the absence of job aids to help performance.

Table 13A in Appendix F presents a breakdown of Table 13 controlling for prior experience. Table 13B presents the results of chi-square tests that compare enumerators in either group who had prior census experience with those who did not (e.g., JPA enumertors with experience vs. JPA enumerators without experience).

The results do not support the hypothesis. Although there was only one (checking for missed housing units) significant difference for JPA trained enumertors on the end-of-training questionnaire, there was also only one difference (getting people to cooperate) for the control enumerators. Moreover, on the post-training questionnaire, there were two significant differences (completing payroll forms and checking for missed housing units) for the JPA group, but only one (interviewing people) for the control group.

If the "No Prior Experience" group in Table 13A is compared with Table 13, it is apparent that the response pattern is closely approximated. However, a different pattern occurs when the "Prior Experience" group is examined separately. Table 13C presents the results of chi-square tests comparing the JPA and control groups for different levels of experience.

JPA and control enumerators with prior experience, and before work experience, differed in their perceptions on only one task (filling out payroll forms) that they thought would cause problems when they started working, whereas JPA and control enumerators with no prior experience differed in their perceptions of the expected difficulty of three tasks (filling out payroll forms, using job reference manuals, and getting people to cooperate).

After job experience, the JPA and control enumerators with prior experience differed on two tasks (filling out payroll forms and dealing with unusual situations), whereas the JPA and control enumerators with no prior experience differed on six tasks (see table 13C). These differences suggest that prior experience reduces some of the training benefits associated with the use of job aids; however, an analysis of individual tasks shows some interesting differences that can still be attributed to differences in training. For example, approximately the same proportion of JPA and control enumerators with prior experience expected difficulties dealing with unusual situations on the end-of-training questionnaire (37.7% and 38.1%, respectively). However, after job experience the percent of JPA-trained enumerators who thought that this topic was not covered well enough in training dropped by over 25 percentage points, whereas the control enumerators dropped by less than 3 percentage points. The drop in the proportion of JPA enumerators was statistically significant ($\chi^2 = 64.2$, 1 df, $p = 0.00$), whereas the change in the proportion of control enumerators was not ($\chi^2 = 0.2$, 1 df).

One other comparison between enumerators with and without prior census experience was also of interest because it supported the assumption that, although the number of missing questionnaires was higher in the control group, the sample obtained was representative. For example, Table 14 compares the percentages of enumerators who reported prior census experience. Although the enumerators in the groups (JPA and control) differed significantly in their levels of experience on both occasions ($p < .05$), the percentages of enumerators reporting prior experience changed little from one occasion to the next.

TABLE 14

Enumerators Reporting Prior Experience Working In The 1980 Census

	End-of-Training	Post-Training
JPA	12.5%	11.5%
Control	17.3	18.9

As mentioned previously, one view of training is that it affects an enumerator's attitude toward both his/her job, as well as the census. In fact, it has been conjectured that poor training might affect an enumerator's decision to stay with a given job or to take a different census job, once the present one was completed. Assuming that JPA training did a better job of preparing enumerators for their jobs, it was hypothesized that proportionally more JPA enumerators would express an interest to work in other (1980) census jobs. Responses of enumerators to the question, "If asked, would you work in another census job?" are presented in Table 15. Breakdowns by district office pairs are reported in Table 15A in Appendix F.

TABLE 15

Enumerators' Willingness to Work in Other Census Jobs

	JPA	Control
Yes	61.0	54.1
No	7.1	11.7
Depends on Job	31.8	34.2

Although JPA enumerators expressed significantly more unqualified interest in working in other census jobs ($\chi^2 = 11.7$, 2 df, $p = 0.00$), it cannot be concluded that this difference was due solely to the JPA training. This finding must be interpreted cautiously in the context of other comparisons.

To determine what enumerators specifically disliked about their training, a space was provided on the end-of-training questionnaire for comments. These comments were then collapsed by one coder into major categories. Since respondents are usually reluctant to write responses on multiple-choice or checklist questionnaires, any category that was mentioned by at least one percent of the enumerators was reported in Table 16.

TABLE 16

Major Dislikes About Training Cited by Enumerators

N = 1,168 JPA	%	N = 1,104 Control	%
Poor training facilities	7	Poor training facilities	8
Poor organization of training (e.g., jumping around between manuals and workbooks)	3	Poor organization of training (e.g., jumping around between manuals and workbooks)	6
Too long	3	Too long	5
Too much information presented in two days	3	Too short	5
Too much paperwork	3	Too much information presented in two days	5
Too short	3	Too much repetition/trivia	5
Too much repetition/trivia	3	Sitting too long	2
Sitting too long	2	Lecture from training guide	1
Poor audiovisuals	2	Poor audiovisuals	1

Poor training facilities led the list of complaints in both groups. Moreover, the lists of complaints were quite similar; the only differences were complaints about too much paperwork in the JPA training and lecture from the training guide in the control training.

Supplemental Findings

The following descriptive results were not dependent variables of interest in this experiment, but are presented because of their possible effects on enumeration during a census.

An issue which has been of increasing importance, especially in urban enumeration districts where coverage may be affected, concerns an enumerator's willingness to work in neighborhoods where personal safety may be a real or imagined worry. Table 17 presents the responses of enumerators to the question "Are there any neighborhoods in your assignment that you have been afraid to work in?"

TABLE 17

Enumerators' Reported Fear of Working in Certain Neighborhoods in Their Assignment Areas

		Percentage "Yes"
Control Offices	S.W. Brooklyn	16.5
	Pitts. E.	19.2
	W. Columbus	13.3
	Overall	16.4
JPA Offices	W. Queens	16.3
	Pitts. W.	11.7
	S. Dayton	14.4
	Overall	14.7

These results suggest that enumerators' fears about safety are not a minor problem. A chi-square comparison between the two groups for the overall responses was nonsignificant (X^2 = .74, 1 df, p = .39) which indicates that enumerator "fear" should not be a confounding variable in this study.

Enumerators who had expressed a fear of working in certain neighborhoods were then asked to check off or suggest alternative procedures that could be followed in those cases. Table 18 presents these major alternatives ranked in terms of their frequency of selection. The actual number of times an option was checked is presented in parentheses.

TABLE 18

Rankings of Suggested Procedures to Follow When an Enumerator is Afraid to Work in a Neighborhood in His/Her Assignment Area

N = 952 JPA		%	N = 560 Control		%
Work with another enumerator	(109)	80	Work with another enumerator	(60)	65
Enumerate only during daytime	(67)	49	Enumerate only during daytime	(37)	40
Work with crew leader	(27)	20	Work with crew leader	(23)	25
Send a different enumerator	(14)	10	Enumerate alone	(11)	12
Enumerate alone	(13)	9	If people aren't home first visit, don't return	(11)	12
Leave those addresses to last	(10)	7	Send a different enumerator	(7)	8
If people aren't home on first visit, don't return	(9)	7	Leave those addresses to last	(6)	7

NOTE: % is based on number of enumerators who answered "yes" to question about being afraid to work in certain neighborhoods in their assignment area.

In both groups, team and daytime enumeration led the list of suggested procedures for enumerating in neighborhoods where personal safety was a concern.

On the post-training questionnaire, enumerators were also asked to mark three changes that the Bureau could make to improve the enumerator's job. Although the instructions were to mark only three options, a substantial number of enumerators marked all the options as if a 3-point scale existed for this question. Accordingly, these responses were analyzed by computing the frequency that a suggested improvement was marked "Most Important." Rankings of suggested improvements are presented in Table 19 for both groups. The number in parentheses represents the frequency that an improvement was marked "Most Important."

TABLE 19

Rankings of Suggested Improvements Given "Most Important" Rating

N = 952 JPA		%	N = 560 Control		%
Pay more money	(432)	46	Pay more money	(252)	45
Pay by the hour	(343)	37	Pay by the hour	(209)	37
Pay on time	(267)	29	Simplify the questionnaire	(144)	26
Simplify the questionnaire	(216)	23	Pay on time	(142)	25
Allow overtime	(160)	17	Allow overtime	(83)	15
Allow team enumeration	(133)	14	Improve the training	(77)	14
Allow work on Sunday	(102)	11	Allow team enumeration	(76)	14
Improve the training	(89)	10	Simplify the job	(68)	12
Simplify the job	(70)	8	Allow work on Sunday	(52)	9
Use telephones for followup	(61)	7	Use telephones for followup	(36)	6
Better supervisors	(26	3	Better supervisors	(16)	3

As expected, based on reports from past censuses, complaints about pay led the list of suggested improvements, although the need for a simplified questionnaire was also rated highly in both groups.

No further analyses of items on either the end-of-training or post-training questionnaires will be reported in this memorandum. The next memorandum in this PERM series will present those results, as well as a discussion of items on the Enumerator Performance Record.

Discussion

Based on the results presented in this memorandum, it can be concluded that JPA training differed significantly from standard census training, although the differences were generally small as assessed by attitudinal measures. Morever, both training approaches, at least in terms of enumerators giving positive ratings, appeared to be well received.

The generally high ratings given both training approaches and the size of the differences obtained are not that surprising considering that most enumerators (except those with prior census experience) had no basis for comparison; that is, they did not receive JPA training followed by some standard training or vice versa. Further, since it can be assumed that enumerators do not come from a population with a great deal of recent exposure to formal training or educational settings, the relatively high ratings on all attitudinal measures used are understandable since they were probably influenced by the novelty of the situation (formal, structured training) and a "halo" effect; that is, a generally positive reaction to the training resulted in high ratings on all measures. These effects are common when attitudinal measures are used. Nevertheless, it is important to note that most of the differences found favored the JPA training, especially after job experience, and when prior experience working in the census was controlled for in the analyses.

As with any field study, problems in interpretation, particularly of the post-training results, remain. Serious field problems occurred in all the participating district offices which, if more severe in the control group, could have depressed the attitude measures in those offices. On the other hand, there was anecdotal evidence that the higher return rates of evaluation data in the JPA group resulted from better support by field staff in those offices (District Office Managers and Field Operations Assistants) who saw significant differences in the alternative materials, appointed highly competent clerks, and supported those clerks in their efforts to obtain evaluation measures and administrative records used to develop enumerator performance records. Such increased cooperation and support in the JPA offices, relative to the control group, could be expected to elicit cooperation from more marginal crew leaders, who would have been underrepresented in the control group. The effects such underrepresentation might have on the attitude and performance measures obtained are problematical, but it could be conjectured that both attitude and performance scores would be depressed if significant numbers of marginal crews were included. On the other hand, it is also possible that the increased support in the JPA offices caused more positive attitudes in both crew leaders and their enumerators, thereby raising their scores on the measures used in this study.

Problems in interpreting the data presented in this study, as well as specific recommendations for Bureau training programs, will be discussed fully in the next memorandum in this PERM series which will present the results of the field performance data.

APPENDIX A

TABLE 1

Comparison of District Offices on Matching Variables Based on 1970 Census Statistics

	Pair 1		Pair 2		Pair 3	
	Pittsburgh West	Pittsburgh East	South Dayton	West Columbus	West Queens	S. W. Brooklyn
Total Population	626106	622603	704391	689104	644456	651737
% Black	3.1	5.2	3.3	2.8	2.0	2.7
% Urban	88.3	98.2	68.4	80.9	100	100
Median Age	31.8	31.7	25.9	26.7	38.3	33.0
Median Education	12.1	12.2	12.1	*	11.2	11.4
Median Income	10290	10606	10942	9856	11168	11040
Allocation [1] Pop	1.0	1.1	1.1	1.1	1.5	1.6
Rates Housing	2.2	2.1	1.8	2.1	2.4	2.5
Mail-back rate 1970	*	*	77.9	78.0		

* - data not available

[1] These rates are estimates of missing census data for population(Pop) and housing questions.

TABLE 2

Percentage of Enumerators Trained on Selected Starting Dates in April 1980

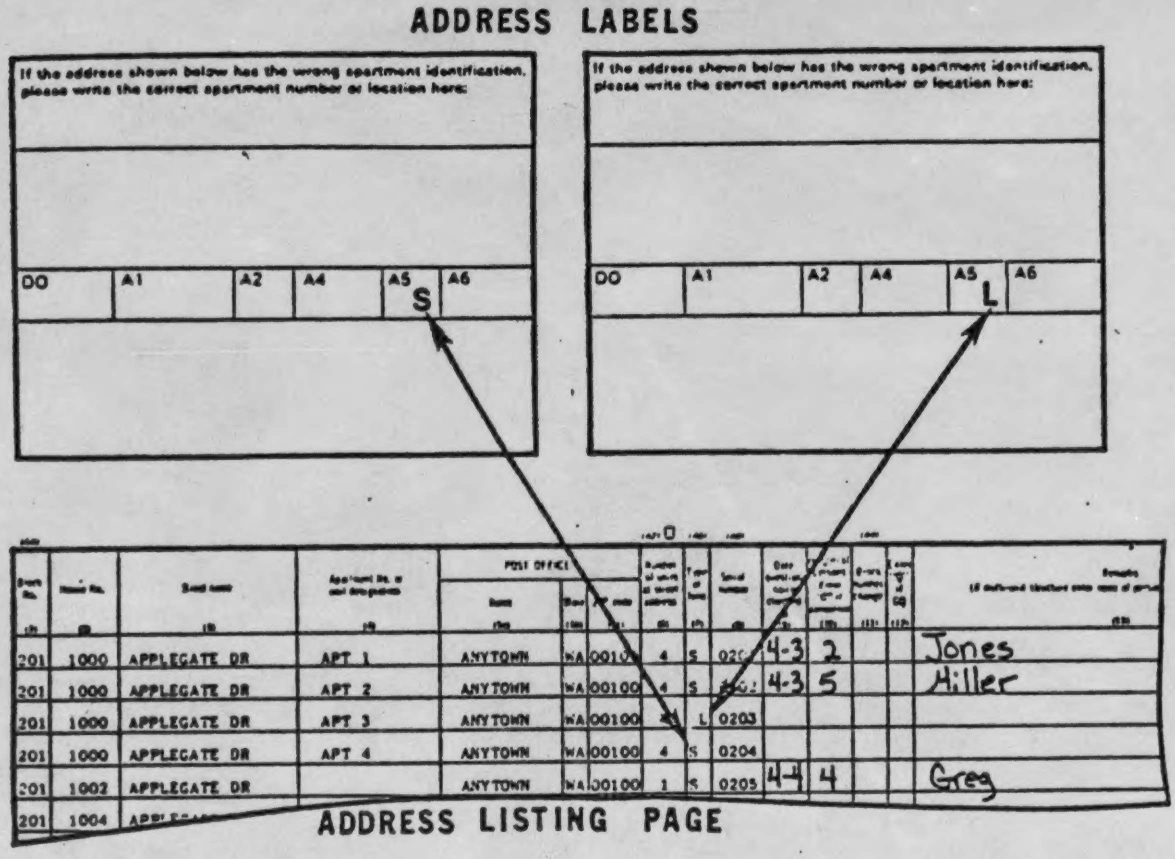
		DATE									
	April	10	11	14	15	16	17	21	22	28	Total
Control Offices	S.W. Brooklyn	0	0	88	0	0	5	0	3	1	97
	Pittsburgh E.	21	5	41	5	5	2	1	6	7	93
	W. Columbus	0	0	0	22	25	0	43	10	1	101
JPA Offices	W. Queens	0	0	8	83	6	0	3	0	0	100
	Pittsburgh W.	0	0	95	0	0	0	0	0	1	96
	S. Dayton	0	0	97	0	0	0	0	0	0	97

Note: An excluded date accounts for, at most, 4% of the total cases for a district office. Rounding resulted in the total of 101% for line 3.

APPENDIX B

Illustration 7.A

DETERMINING THE TYPE OF QUESTIONNAIRE



If the address shown below has the wrong apartment identification, please write the correct apartment number or location here:

If the address shown below has the wrong apartment identification, please write the correct apartment number or location here:

201	1000	APPLEGATE DR	APT 1	ANYTOWN	WA	00100	4	S	[illegible]	4-3	2			Jones
201	1000	APPLEGATE DR	APT 2	ANYTOWN	WA	00100	4	S	[illegible]	4-3	5			Hiller
201	1000	APPLEGATE DR	APT 3	ANYTOWN	WA	00100	[illegible]	L	0203					
201	1000	APPLEGATE DR	APT 4	ANYTOWN	WA	00100	4	S	0204					
201	1002	APPLEGATE DR		ANYTOWN	WA	00100	1	S	0205	4-4	4			Greg
201	1004	APP												

7.B DETERMINING THE STATUS OF THE HOUSING UNIT

The procedures you follow during enumeration will vary, based on whether you determine the present status of the housing unit to be occupied, vacant, or nonexistent.

7.B1 Occupied Housing Units

a Occupants Temporarily Absent

If persons usually reside at the housing unit, but they are temporarily absent, consider the housing unit occupied. Determine (from a neighbor, building manager, and so forth) when the occupants will return. Enter this information in column (13), Remarks, of the Address Listing Page on the line for the housing unit and return at that time.

If the occupants are not expected to return before the end of followup 1, obtain all the information you can. You must get at least "last resort" information (see chapter 9, section 9.E).

b Housing Unit Occupied Entirely by Persons Who Did Not Live There on Census Day

If the respondent volunteers that all of the current residents did not live in the unit on Census Day (April 1, 1980), and:

(1) If the respondent says that he/she completed a questionnaire and mailed it back to a census office from another address, then enumerate the unit as either:

(a) VACANT, if no one lived there on Census Day; or

(b) OCCUPIED, if someone else lived there on Census Day; obtain at least "last resort" information about the former residents, as instructed in chapter 9, section 9.E.

(2) If the persons now living in the housing unit were not enumerated at any address, then enumerate them at the address. In this case, do NOT obtain information about former residents.

c Housing Unit Occupied Entirely by Persons with a Usual Home Elsewhere (UHE)

If a respondent says that all persons residing in the housing unit have a usual home elsewhere, enumerate the housing unit as "Vacant, UHE" (see section 7.F).

d Living Quarters Occupied by Nine or More Persons Unrelated to the Person Who Owns or Rents the Housing Unit

If a living quarters is occupied by nine or more persons unrelated to the person(s) who own(s) or rents the housing unit or by ten or more unrelated persons, it is a "special place." Do not complete questionnaires for special places (see chapter 9, section 9.K).

7.B2 Vacant Housing Unit

A "For Sale" or "For Rent" sign is NOT proof that a housing unit is vacant. If no one answers the door, contact a neighbor, janitor, rental agent, real estate agent, or building manager to determine whether the housing unit is actually vacant.

Enumerate the housing unit as vacant if no one is living there at the time of your visit AND one or more of the following conditions exist:

a It is awaiting occupancy.

b It is under construction and the final windows and doors are in place.

c It is a vacation cottage or similar place used only on weekends or during certain times of the year.

d It is used for storage of household furniture.

APPENDIX C

1

FORM D-859
(11-27-79)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

ENUMERATOR TRAINING EVALUATION
20th Decennial Census – 1980

INSTRUCTIONS: The Bureau of the Census wants to know how you feel about the training that you just finished.

Please answer the questions below. Do not write your name on this form.

ENTER YOUR 4-DIGIT DISTRICT OFFICE CODE NUMBER HERE ⟶ ☐☐☐☐

1. Is this your first job working in the 1980 census?
1 ☐ Yes
2 ☐ No

2. How well prepared do you feel to go out and work as an enumerator?
Mark (X) one
1 ☐ Well prepared
2 ☐ Adequately prepared
3 ☐ Poorly prepared
4 ☐ Not prepared

3. Where were you trained?
1 ☐ In a room with 3 or more people
2 ☐ On the job – How long did the training last?
________ Hours

4. The following is a list of different activities used in training.
Mark an (X) in the appropriate column that best describes how each activity helped you learn your job.

	Very helpful	Helpful	Least helpful
a. Lecture by trainer (reading from training guide)	1	2	3
b. Practice interviewing (either with trainer or fellow enumerators)	1	2	3
c. Workbook exercises	1	2	3
d. Reading or using manuals	1	2	3
e. Audiovisuals (slides and tape recordings)	1	2	3
f. Other – *Specify* ↙ ________ ________	1	2	3

5. Was the length of training –
Mark (X) one
1 ☐ Too short?
2 ☐ About right?
3 ☐ Too long?

6. Overall, how would you rate the quality of the training?
Mark (X) one
1 ☐ Very good
2 ☐ Good
3 ☐ Fair
4 ☐ Poor

7. Were the training materials easy to read and understand?
1 ☐ Yes
2 ☐ No

8. The following is a list of different parts of your job.
Mark an (X) by each that you think will cause some problems when you start working.
1 ☐ Locating addresses that did not return a questionnaire
2 ☐ Interviewing people (asking the questions)
3 ☐ Completing the questionnaire (address label, "For Census Use Only" box, etc.)
4 ☐ Completing the address register
5 ☐ Filling out payroll forms
6 ☐ Using the job reference manuals
7 ☐ Getting people to cooperate
8 ☐ Dealing with unusual situations
9 ☐ Answering questions asked by respondent
10 ☐ Checking for missed housing units
11 ☐ Other – *Specify* ↙
____

9. What one thing did you dislike most about the training?
____
____

Comments on reverse ⟶ ☐

APPENDIX D

2

FORM D-860
(11-24-79)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

TRAINING AND PERFORMANCE EVALUATION FOLLOWUP ENUMERATOR

20th Decennial Census – 1980

INSTRUCTIONS: Before you began working, you completed a questionnaire about your training for this job. Now that you have had some job experience, the Bureau of the Census wants to know how that training helped you in your job, and how you feel about your job.

Please answer the questions below. Do not write your name on this form.

ENTER YOUR 4-DIGIT DISTRICT OFFICE CODE NUMBER HERE → ☐☐☐☐

1. Is this your first job working in the 1980 census?

1 ☐ Yes
2 ☐ No

2. How well prepared were you to go out and work as an enumerator?
Mark (X) one

1 ☐ Well prepared
2 ☐ Adequately prepared
3 ☐ Poorly prepared
4 ☐ Not prepared

3. Where were you trained?

1 ☐ In a room with 3 or more people
2 ☐ On the job

4. The following is a list of different parts of your job.
Mark an (X) by each that was not covered well enough in training.

1 ☐ Locating addresses that did not return a questionnaire
2 ☐ Interviewing people (asking the questions)
3 ☐ Completing the questionnaire (address label, "For Census Use Only" box, and item 2 on back page)
4 ☐ Completing the address register (columns 10 and 13)
5 ☐ Filling out payroll forms
6 ☐ Using the job reference manuals
7 ☐ Getting people to cooperate
8 ☐ Dealing with unusual situations
9 ☐ Answering questions asked by respondents
10 ☐ Checking for missed housing units
11 ☐ Other – *Specify*
____
____
____

5. The following is a list of different activities used in training.
Mark an (X) in the appropriate column that best describes how each activity helped you learn your job.

	Most helpful	Helpful	Least helpful
a. Lecture by trainer (reading from training guide)	1	2	3
b. Practice interviewing (either with trainer or fellow enumerators)	1	2	3
c. Workbook exercises	1	2	3
d. Reading and using manuals	1	2	3
e. Audiovisuals (slides and tape recordings)	1	2	3
f. Other – *Specify* ____________	1	2	3

6. How would you rate your own job performance so far?
Mark (X) one

1 ☐ Very good
2 ☐ Good
3 ☐ Fair
4 ☐ Poor

7. If asked, would you work in another census job?
Mark (X) one

1 ☐ Yes
2 ☐ No
3 ☐ Depends on the job

8. On the average, how many times each day do you use –

a. Enumerator manual or job aid manual?

b. Questionnaire reference book?

9. Overall, how would you rate the quality of the training you received for this job?
Mark (X) one

1 ☐ Very good
2 ☐ Good
3 ☐ Fair
4 ☐ Poor

10. The following is a list of suggested improvements.
Mark (X) in order of importance the three changes which you think the Bureau of the Census could make to improve your job

	Most important	Next most important	Third most important
a. Improve the training . . .	1	2	3
b. Pay more money	1	2	3
c. Simplify the job (get rid of the manuals)	1	2	3
d. Allow work on Sunday . .	1	2	3
e. Allow overtime work . . .	1	2	3
f. Pay by the hour, not the questionnaire	1	2	3
g. Do all interviewing using the telephone	1	2	3
h. Have enumerators work in teams	1	2	3
i. Simplify the questionnaire	1	2	3
j. Have better supervisors	1	2	3
k. Pay enumerators on time	1	2	3
l. Other – *Specify*	1	2	3

11. Are there any neighborhoods in your assignment that you have been afraid to work in?

1 ☐ No
☐ Yes – **What should the Bureau let you do about it?** *Mark all that apply*
  2 ☐ Nothing special, just do your normal job
  3 ☐ Leave those addresses to last
  4 ☐ Let you work with another enumerator
  5 ☐ Ask another enumerator to go there
  6 ☐ Not go back if people are not home the first time
  7 ☐ Tell your crew leader to work with you
  8 ☐ Go there only during the daytime
  9 ☐ Other – *Specify*

12. What was your employment status when you were hired for the 1980 census?
Mark (X) one

1 ☐ Looking for a full or part-time job (temporary or permanent)
2 ☐ Not working, not retired, not a student, not looking for a job
3 ☐ Retired
4 ☐ Student
5 ☐ Employed, job starts in the future or temporarily laid off
6 ☐ Employed
7 ☐ Something else – *Specify*

13. Comments

FORM D-660 (11-24-79)

APPENDIX E

FORM D-857(AT)
(11-30-79)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

ALTERNATIVE TRAINING EXPERIMENT

FOLLOWUP I ENUMERATOR PERFORMANCE RECORD

20th Decennial Census – 1980

Forms D-267A or D-267B – Field Employee Selection Aid *(Enter "99" if no test score)*

9. Selection test score (item D)

Form D-185 – Record of First Review
(Enter "99" if form is not available.)

10. Number of "No's" in Part A

11. Part A results
Mark (X) one
1 ☐ Satisfactory
2 ☐ Needs improvement
3 ☐ Unsatisfactory
4 ☐ No form completed

12. Number of short form errors

13. Number of long form errors

14. Part B results
Mark (X) one
1 ☐ 0–4
2 ☐ 5–20
3 ☐ More than 20
4 ☐ No form completed

Form D-158 – Record of Reinterview
(Enter "99" if person's name is not on form.)

15. Number of fails *(Look for more than one box if there are any fails.)*

Form D-275 – Record of Training

1. D.O. code	2. C.L.D. No.	3. Training dates April _____ to April _____

4. Enumerator name

5. Telephone No.

6. ED No. (0000, if reserve)

7. Review test score

8. Did the enumerator complete training? *Mark (X) one*
1 ☐ Yes 2 ☐ No 3 ☐ Don't know

Form D-170 – QC Enumerator Daily Progress Record
(Use first two forms for each crew leader district.)

16. Date (item 6) April _____	17. No. of acceptable questionnaires
18. Date (item 6) April _____	19. No. of acceptable questionnaires

Form D-152 – Crew Leader Record of Assignments
(Use at end of Followup I)

20. Did enumerator complete ED? ("X" in front of ED No.)
Mark (X) one
1 ☐ Yes
2 ☐ No
3 ☐ Don't know
4 ☐ Not on form

Form D-291 – Employee Pay Voucher
(Check at end of Followup I)

21. Reason for separation
Mark (X) one
1 ☐ Assignment completed
2 ☐ Pay dissatisfaction
3 ☐ Work dissatisfaction
4 ☐ To take another job
5 ☐ Poor performance
6 ☐ No form available
7 ☐ Other – *Specify* ↘

____

Form D-153 – Crew Leader Record of Progress
(Use at end of Followup I) (Enter "999" if person is not on form.)

22. Copy the third entry for each enumerator or last entry)

APPENDIX F

TABLE 3B

District Office Comparisons For Degree Of Preparedness

Question: "How well prepared do you feel to go out and work as an enumerator?"

End-of-Training

	(391) *W. Queens	(290) S.W. Brook.	(312) *Pitts. W.	(286) Pitts. E.	(455) *S. Dayton	(509) W. Col.
Well Prepared	52.4%	59.7%	46.5%	50.7%	44.8%	40.3%
Adequately Prepared	46.8	38.6	52.6	47.9	54.9	58.0
Poorly Prepared	0.8	1.7	1.0	1.4	0.2	1.6
Not Prepared	0.0	0.0	0.0	0.0	0.0	0.2

Post-Training

	(393) *W. Queens	(123) S.W. Brook.	(158) *Pitts. W.	(217) Pitts. E.	(368) *S. Dayton	(217) W. Col.
Well Prepared	65.1%	61.0%	63.3%	58.1%	55.2%	47.9%
Adequately Prepared	34.1	34.1	36.1	39.6	42.9	50.7
Poorly Prepared	0.3	4.1	0.6	2.3	1.9	1.4
Not Prepared	0.5	0.8	0.0	0.0	0.0	0.0

*JPA offices; base of precentage is in parentheses above district office name.

TABLE 3C

Chi-Square Statistics for District Office Comparisons

	W. Queens & S.W. Brook.		Pitts. W. & Pitts. E.		S. Dayton & W. Col.	
	X^2	P	X^2	P	X^2	P
End-of-Training	5.4	.07	1.4	.49	7.2	.07
Post-Training	12.1	.01	2.3	.31	3.4	.19

TABLE 3D

Comparison of Changes in Responses (from end-of-training to post-training) On the Preparedness Question for Each District Office

District Office	χ^2	df	p
W. Queens	0.0	1	1.00
Pittsburgh W.	0.0	1	1.00
S. Dayton	4.4	1	0.04
S.W. Brooklyn	2.2	1	0.14
Pittsburgh East	0.2	1	0.68
W. Columbus	0.0	1	0.96

Note: "Well" and "Adequately Prepared" responses were collapsed into a prepared category, and "Poorly" and "Not Prepared" responses were collapsed into a not prepared category for the above analysis.

TABLE 7A

District Office Comparisons For Quality Of Training

Question: "Overall, how would you rate the quality of the training?"

End-of-Training

	(390)	(294)	(315)	(285)	(458)	(514)
	*W. Queens	S.W. Brook	*Pitts. W.	Pitts. E.	*S. Dayton	W. Col.
Very Good	52.8%	55.4%	57.1%	52.6%	60.5%	43.4%
Good	41.0	34.4	36.5	38.9	36.0	48.2
Fair	5.6	9.9	5.1	7.7	3.1	7.8
Poor	0.5	0.3	1.3	0.7	0.4	0.6

Post-Training

	(380)	(114)	(153)	(212)	(354)	(200)
	*W. Queens	S.W. Brook	*Pitts. W.	Pitts. E.	*S. Dayton	W. Col.
Very Good	52.6%	49.1%	70.6%	45.8%	60.2%	41.5%
Good	43.2	40.4	26.1	44.8	35.3	52.0
Fair	2.9	7.9	2.6	9.4	3.4	6.5
Poor	1.3	2.6	0.7	0.0	1.1	0.0

*JPA offices; base of percentage is in parentheses above district office name.

TABLE 7B

Chi-Square Statistics for District Office Comparisons

	W. Queens & S.W. Brook		Pitts. W. & Pitts. E.		S. Dayton & W. Col.	
	X^2	p	X^2	p	X^2	p
End-of-Training	6.3	.10	2.9	.40	32.1	.00
Post-Training	6.7	.08	25.8	.00	21.9	.00

TABLE 7C

Comparison of Changes in Responses (from end-of-training to post-training) On the Quality Question for Each District Office

District Office	χ^2	df	p
W. Queens	1.1	1	0.29
Pittsburgh W.	1.4	1	0.24
S. Dayton	0.3	1	0.57
S.W. Brooklyn	0.0	1	1.00
Pittsburgh E.	0.1	1	0.82
W. Columbus	0.5	1	0.50

Note: "Very Good" and "Good" responses were collapsed into an acceptable category, and "Fair" and "Poor" responses were collapsed into an unacceptable category for this analysis.

TABLE 13A

Percentage of Enumerators Checking Job Tasks Prior to And After Job Experience

End-of-Training question: "The following is a list of different parts of your job. Mark an (X) by each that you think will cause some problems when you start working."

Post-Training Question: "The following is a list of different parts of your job. Mark an (X) by each that was not covered well enough in training."

	End-of-Training					
	Prior Experience			No Prior Experience		
	(146) JPA a.	(189) Control b.	(335) Overall c.	(1021) JPA d.	(905) Control e.	(1926) Overall f.
Locating addresses	7.5%	8.5%	8.1%	8.0%	6.6%	7.4%
Interviewing people	16.4	11.1	13.4	11.0	8.7	9.9
Completing the questionnaire	6.8	4.2	5.4	7.8	5.9	6.9
Completing the address register	2.7	4.2	3.6	4.9	6.4	5.6
Filling out payroll forms	4.8	12.7	9.3	8.7	15.5	11.9
Using job reference manuals	7.5	13.2	10.7	4.8	8.4	6.5
Getting people to cooperate	45.2	45.5	45.4	50.0	35.0	43.0
Dealing with unusual situations	37.7	38.1	37.9	43.4	39.3	41.5
Answering respondent questions	8.2	10.1	9.3	10.8	10.9	10.9
Checking for missed housing units	11.6	15.9	14.0	20.6	19.2	19.9

NOTE: Base for percentages is reported in parentheses above each column.

TABLE 13A (Continued)

Post-Training

	Prior Experience			No Prior Experience		
	(107) JPA a.	(106) Control b.	(213) Overall c.	(820) JPA d.	(454) Control e.	(1274) Overall f.
Locating addresses	5.6%	5.7%	5.6%	8.7%	10.4%	9.3%
Interviewing people	2.8	0.9	1.9	7.4	8.1	7.7
Completing the questionnaire	2.8	5.7	4.2	5.5	9.7	7.0
Completing the address register	3.7	6.6	5.2	4.8	9.7	6.5
Filling out payroll forms	1.9	10.4	6.1	12.6	17.0	14.1
Using job reference manuals	1.9	7.5	4.7	4.8	8.8	6.2
Getting people to cooperate	15.0	17.9	16.4	14.8	21.4	17.1
Dealing with unusual situations	12.1	35.8	23.9	18.7	26.2	21.4
Answering respondent questions	2.8	5.7	4.2	7.4	9.0	8.0
Checking for missed housing units	1.9	14.2	8.0	14.1	15.9	14.8

NOTE: Base for percentages is reported in parentheses above each column.

TABLE 13B

Chi-Square Statistics For JPA and Control Groups Controlling for Prior Experience

	End-of-Training					
	JPA		Control		Overall	
	χ^2	p	χ^2	p	χ^2	p
Locating addresses	0.0	0.96	0.6	0.46	0.1	0.74
Interviewing people	3.2	0.07	0.8	0.37	3.4	0.06
Completing the questionnaire	0.0	0.80	0.5	0.48	0.8	0.36
Completing the address register	0.9	0.34	0.9	0.33	1.9	0.16
Filling out payroll forms	2.1	0.15	0.7	0.40	1.7	0.19
Using job reference manuals	1.4	0.23	3.8	0.05	7.2	0.01*
Getting people to cooperate	1.0	0.31	6.9	0.01*	0.6	0.45
Dealing with unusual situations	1.5	0.22	0.1	0.81	1.4	0.24
Answering respondent questions	0.6	0.42	0.1	0.82	0.6	0.44
Checking for missed housing units	5.9	0.01*	0.9	0.33	6.1	0.01*

*Indicates significant difference, $p < .05$

TABLE 13B (CONTINUED)

Post-Training

	JPA		Control		Overall	
	χ^2	p	χ^2	p	χ^2	p
Locating addresses	0.8	0.37	1.7	0.19	2.6	0.11
Interviewing people	2.5	0.12	6.0	0.01*	8.8	0.00*
Completing the questionnaire	0.9	0.34	1.3	0.26	1.8	0.18
Completing the address register	0.1	0.82	0.7	0.42	0.4	0.55
Filling out payroll forms	9.7	0.00*	2.3	0.13	9.7	0.00*
Using job reference manuals	1.2	0.26	0.1	0.82	0.5	0.48
Getting people to cooperate	0.0	1.00	0.4	0.51	0.0	0.88
Dealing with unusual situations	2.3	0.13	3.5	0.06	0.6	0.45
Answering respondent questions	2.5	0.12	0.9	0.35	3.2	0.07
Checking for missed housing units	11.8	0.00*	0.1	0.77	6.5	0.01*

*Indicates significant difference, $p < .05$

TABLE 13C

Chi-Square Statistics for JPA vs Control Groups Controlling for Prior Census Experience

	End-of-Training				Post-Training			
	Prior Experience		No Prior Experience		Prior Experience		No Prior Experience	
	X^2	p	X^2	p	X^2	p	X^2	p
Locating addresses	0.1	0.91	1.2	0.28	0.0	1.00	0.8	0.37
Interviewing people	1.6	0.21	2.5	0.12	0.2	0.60	0.1	0.73
Completing the questionnaire	0.7	0.42	2.6	0.11	0.5	0.49	7.3	0.01*
Completing the address register	0.2	0.67	1.8	0.18	0.4	0.53	10.9	0.00*
Filling out payroll forms	5.2	0.02*	20.2	0.00*	5.3	0.02*	4.3	0.04*
Using job reference manuals	2.2	0.14	9.7	0.00*	2.7	0.10	7.6	0.01*
Getting people to cooperate	0.0	1.00	43.6	0.00*	0.2	0.69	8.5	0.00*
Dealing with unusual situations	0.0	1.00	3.1	0.08	15.1	0.00*	9.5	0.00*
Answering respondent questions	0.1	0.70	0.0	0.97	0.5	0.49	0.8	0.37
Checking for missed housing units	0.9	0.34	0.5	0.50	9.3	0.00	0.6	0.46

*Indicates significant difference, $p < .05$.

TABLE 15A

District Office Comparisons of Desire for Future Census Employment

Question: "If asked, would you work in another census job?"

	(397) *W. Queens	(121) S.W. Brook.	(158) *Pitts. W.	(216) Pitts. E.	(369) *S. Dayton	(218) W. Col.
Yes	62.0%	51.2%	63.9%	51.4%	58.8%	58.3%
No	7.3	15.7	8.9	9.3	6.2	11.9
Depends on the job	30.7	33.1	27.2	39.4	35.0	29.8

*JPA offices; base of percentage is in parentheses above district office name.

TABLE 15B

Chi-Square Statistics for Office Pairs

	x^2	p
W. Queens vs S.W. Brook.	9.0	0.01
Pitts. W. vs Pitts. E.	6.5	0.04
S. Dayton vs W. Col.	6.4	0.04

Report Number 2

SUMMARY

Overview

A previous memorandum in this series (PERM No. 9) described the design and development of the Alternative Training Experiment and compared reactions of followup 1 enumerators on a variety of attitudinal measures. The purpose of this memorandum is to compare the performance of enumerators trained using alternative materials (Job-Performance-Aided training) with the performance of enumerators trained using standard (control) census materials. The performance measures analyzed included end-of-training knowledge tests, self-report measures, and quality control records obtained as part of normal field operations.

Since the intent of PERM reports is to circulate information among Bureau staff members as quickly as possible, it is emphasized that this memorandum is a preliminary report. As such, additional analyses are likely to be done and, accordingly, conclusions and recommendations may change.

Summary of Results

A problem noted in PERM No. 9 - differential rates of missing data in the JPA and control offices - also occurred with most of the performance measures described in this study. Further, all measures of enumerator production were below pre-census expectations. Accordingly, it was concluded that field problems, primarily problems with address registers, lowered production levels and confounded experimental comparisons during the time period in followup 1 of most interest for assessing the effects of the alternative training approach.

Other findings also raised serious questions about the reliability and validity of the production measures. For example, intercorrelations among production measures indicated only weak to moderate relationships, even though the measures were similar and collected in contiguous time periods. Further, the production measures, which were collected during the initial days of followup 1, were of no value in predicting the closing dates of the participating district offices, a result that brings into question the validity of the measures as true indicators of the progress of fieldwork in a district office. These findings, buttressed by ancedotal feedback about the prevalence of field problems, precluded any definitive statements about the effects of the alternative training on job performance.

Although no conclusions about the effects of training on job performance were possible, several other findings were of interest and raised important issues in the planning of future censuses and conduct of experimentation. Specifically:

1. Extreme variation between district offices was found on many of the measures analyzed. Accordingly, the utility of conducting experimental comparisons with small sample sizes of district offices was questioned.
2. Recordings of quality control measures used in this study were flawed for two reasons:
    a. in the face of pressure to maintain production and keep the census on schedule, they were either not done or,

    b. if done, procedures were often not followed correctly.

3. Paying enumerators an hourly wage at some point during followup 1 significantly reduced attrition. Moreover, rates of enumerator attrition were significantly related to the closing dates of district offices, suggesting that paying hourly wages may be a more cost-effective strategy than paying piece-rate wages in future censuses.

4. Relatively low rates of manual use by inexperienced followup 1 enumerators questioned the assumption on which much of decennial training was based. Specifically, certain topics were only briefly covered in training because it was assumed that enumerators would refer to their manuals if the need arose.

5. Verbatim training apparently achieved the goal of delivering standardized training, i.e., the average scores of enumerators on training review tests did not differ significantly in district offices receiving either the alternative (JPA) or standard (control) training.

Outline of Paper

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UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, D.C. 20233

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1980 Census

PRELIMINARY EVALUATION RESULTS MEMORANDUM NO. 12

Prepared by: William Mockovak, Center for Social Science Research

Subject: The Alternative Training Experiment: Analysis of Performance Data, Discussion, and Recommendations

Purpose

A previous memorandum in this series (PERM No. 9) described the rationale for and development of alternative enumerator training materials that stressed the use of job performance aids (JPA's)[1] in both the followup 1 enumerator's manual and classroom training. That memorandum also compared the reactions of enumerators, on a variety of attitudinal measures, who had been trained using either job performance aids (JPA group) or standard census reference materials (control group). The purpose of this memorandum is to present additional comparisons on a variety of performance measures that were collected during this experiment, which was one of six experimental programs conducted as part of the 1980 Decennial Census Evaluation and Research program. In addition, limitations of the data (both attitudinal and performance) and recommendations for Bureau training programs will also be discussed.

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[1] Job performance aids in the context of this experiment refer to alternative formats (e.g., flowcharts, checklists, decision tables) for presenting procedural information that would typically be presented in paragraph form.

Note: The data in this report are preliminary and tentative in nature. Users of the results memoranda should understand that these documents are prepared for internal office use, with the aim of circulating information among Bureau staff members as quickly as possible. These memoranda, therefore, do not undergo the careful review and clearance normally associated with published census documents. Conclusions and recommendations contained herein essentially reflect the thoughts of certain staff members at a point in time, and should not be interpreted as statements of Bureau position.

Performance Measures

Rather than attempt to develop a single, overall measure of enumerator job performance, this study used a variety of individual indices including self-report measures, test scores after training, Quality Control enumerator reports, and crew leader quality control and administrative records. Following in Table 1 is a listing of each measure used and the percentage of enumerators from the JPA and control groups with data available for analysis.

TABLE 1

Sources of Performance Data and the Percentage of Enumerators in the JPA and Control Groups with Usable Data

		N=1,177	N=1,349
Measure	Source	JPA	Control
1. Self-report of enumerator performance	Post-training questionnaire	76.6%	40.7%
2. Self-report of manual (JPA or standard) use	Post-training questionnaire	76.4	39.4
3. Self-report of Questionnaire Reference Book (QRB) use	Post-training questionnaire	76.4	39.4
4. Final review test score after training	Classroom training	85.4	79.1
5. Cumulative number of questionnaires reportedly completed by enumerator after 3 days of work during followup 1	D-153, Crew Leader Record of Progress	90.1	85.0
6. Number of acceptable questionnaires completed by an enumerator as reported on the first QC Enumerator progress record	D-170, QC Enumerator Daily Progress Record	84.7*	65.0*
7. Number of acceptable questionnaires completed by an enumerator as reported on the second QC Enumerator progress record	D-170, QC Enumerator Daily Progress Record	77.7*	51.5*
8. Results of a crew leader's "First Review" of an enumerator's work	D-185, Record of First Review	80.0*	70.0*
9. Results of a crew leader's verification of household composition as reported by followup 1 enumerators	D-158, Record of Interview	36.4*	29.4*

* These are conservative estimates because the denominators include enumerators who quit or were released prior to the completion of the form(s).

As noted in the previous memorandum in this series (PERM NO. 9), the JPA group had higher return rates (fewer missing data) for each of the measures used. However, as Table A in the appendix shows, this difference was not consistent for each district office pair across all evaluation measures.

Two problems with the evaluation measures became apparent early in the study, one of which is reflected in the figures shown in Table 1. First, the evaluation measures were not being completed and, second, when completed, the established procedures for completing the measures were often ignored. For example, the data-capture clerk in the Pittsburgh East district office reported that despite personally calling all the crew leaders, several still did not complete the forms required for first review (D-185) or the telephone reinterview (D-158). Moreover, the Senior Office Clerk (SOC) for the Field Operations Supervisor (FOS) failed to collect or file any of the quality control data in the district office. Such lack of support from office and field personnel obviously affected the return rates of the evaluation measures for this district office.

The second problem, procedures not being followed when forms were completed, is based primarily on anecdotal reports from data-collection clerks and reviews of samples of forms. These apparent shortcomings will be discussed more fully when each evaluation measure is discussed in turn in the next section of this report. One obvious example, however, was the completion of a form by Field Operations Assistants (FOA's) which estimated the length of training for follow-up 1 enumerators. Although both crew leaders and FOA's were reassured that this form would not affect an enumerator's pay for training (enumerators were to be paid for 2 days of training), most estimates of training time were exactly 16 hours, the amount of time prescribed by the crew leader manual. When crew leaders in one office were asked about this unlikely consistency, they reported that they did not trust reassurances about pay not being reduced if training finished before the allotted time had expired.

Results and Discussion

Before finishing training, enumerators in both the JPA and control groups were required to complete final tests that reviewed the major concepts and content of the training. Reflecting the differing goals and learning activities of the writers who prepared them, these tests varied both in content and purpose. For example, the JPA test was designed as a final criterion measure; that is, enumerators either got a minimum number of test items correct or else remained in class for additional classroom instruction. This requirement to obtain a minimum passing score on the final review test was not a feature of the control training. Instead, it was designed merely as a means for reviewing major job concepts.

Since comparisons between training methods were not possible, a one-way analysis of variance (ANOVA) was computed separately for each group. The purpose of this analysis was to determine if district offices in either group differed on their mean test scores. Such differences, if found, could reflect either a failure of a training approach to deliver standardized training or some other possible systematic difference between offices, such as differences in the education of enumerators or in the quality of trainers.

To ensure standardization of scoring, a sample of 84 tests was randomly selected from each district office and scored by the same person. As the results in Table B of the appendix show, the hypothesis of equality of mean test scores between JPA offices could not be rejected. However, the hypothesis was rejected for the control offices, with the S.W. Brooklyn district office's mean score significantly lower than the other two control offices. Although this difference was statistically significant, it amounted to only a mean difference of 1.06-1.43 points on a 30-point scale.

Since lower selection test scores were one possible explanation for this finding (see Table 7), an analysis-of-covariance model was analyzed with selection test scores as the covariate. This analysis indicated that when selection test scores were accounted for, the mean review test scores in the control district offices were no longer significantly different. Therefore, it was concluded that both training approaches were successful in delivering standardized training.

Self-Report of Enumerator Performance

Although asking for a self-report of performance typically produces unreliable data, such a question was asked on the post-training questionnaire to determine how such responses varied with the quantitative measures used in this study. As shown in Table 2, there were no significant differences in the response patterns of JPA or control enumerators. Table C in the appendix gives a similar breakdown for matched pairs of district offices.

TABLE 2

Enumerators' Self-Reported Job Performance

Question: "How would you rate your own job performance so far?"

	N=901 JPA	N=549 Control
Very Good	37.4%	34.8%
Good	52.4	54.5
Fair	9.4	10.0
Poor	0.8	0.7

The breakdown in Table C for office pairs is of value because of the difference in response patterns found in the S. Dayton office. It is possible that factors unique to that office (e.g., field problems) affected performance.

Self-Reported Average Daily Use of Manuals

One expressed purpose of the JPA training was to stress the use of the job aid manual during training both to simplify the presentation of procedural information and to provide the enumerators with the skills necessary to use the manual when it was required on the job. It was hypothesized that a simplified job manual would be used more frequently on the job, thereby resulting in closer adherence to procedures and higher quality data. Although no modifications were made to the Questionnaire Reference Book (QRB), an identical question was asked about the QRB to determine how often this manual was also used.

The means and standard deviations of manual (job aid or standard) and QRB use are reported in Table 3. It should be noted that this question was asked on the post-training questionnaire which was completed by an enumerator during first review, or approximately 2-4 days after nonresponse followup was started in an enumeration district. Any differences in manual use attributable to training were expected only during this period because if an enumerator's performance was judged deficient during first review, the crew leader was supposed to give on-the-job training which could have washed out any behavioral differences resulting from different training approaches.

TABLE 3

Enumerator's Self-Reported Average Daily Use of the Enumerator Manual (Job Aid or Standard) and QRB

Question: "On the average, how many times each day do you use--"

	JPA		Control	
	Mean	SD	Mean	SD
Manual (Standard or Job Aid)	2.02	2.13	1.77	1.81
QRB	1.04	1.66	1.27	1.59
Total	3.06		3.04	

It is interesting to note that both groups reportedly used their manual and QRB a total of about three times each day. To determine whether or not the means of reported use differed, two different analyses of variance were computed, each making different assumptions about the data.

The first model was an analysis-of-variance model for nested factors (census district offices nested under training approach) described in Winer (1962, p.184).[2] This model assumes no interaction effect between training approach and district office. The ANOVA table is presented in Table D of the appendix and shows that both type of training and district office significantly affected manual use, although the amount of explained variance was only four percent (square of multiple correlation coefficient, R=0.2).

The second model analyzed was also an ANOVA model, but in this case it was assumed that a matched pair of district offices represented one office with two different kinds of training (i.e., a 3 x 2 model with district office and type of training as main effects). The results of this analysis are presented in Table E in the appendix. In this case an interaction term was included in the model and it was significant, indicating that manual use varied depending on the district office pairing. Figure 1 in the appendix graphically represents this interaction and shows that the third pair - S. Dayton and W. Columbus - caused the interaction.

A comparison of individual district office means for both manual and QRB use is shown in Table 4. These analyses show that the greater overall manual use found for the JPA group was attributable to one JPA office, the S. Dayton office.

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[2] Winer, B. J. Statistical principles in experimental design, New York, NY; McGraw-Hill Book Company, 1962.

TABLE 4

District Office Comparison of Means for Reported use of Manual and QRB

	(386) *W. Queens	(117) S.W. Brook.	(155) *Pitts. W.	(214) Pitts. E.	(358) *S. Dayton	(201) W. Col.
Job Aid or Standard Manual	1.6(1.9)	1.7(1.8)	1.8(1.8)	1.8(1.9)	2.6(2.3)	1.8(1.7)
QRB	1.0(1.7)	1.4(1.7)	0.8(1.2)	1.3(1.7)	1.2(1.8)	1.2(1.5)

* JPA offices

NOTE: Means are based on number above district office name. Standard deviations are reported in parentheses next to mean.

Similar analyses were also performed for the reported use of the QRB. Table D.1 in the appendix presents the ANOVA which uses a nested design and Table E.1 the ANOVA which assumes equivalence of offices in a matched pair. In both these analyses the control district offices had a higher reported use of the QRB, although the design factors account for a trivial amount of the total variance (square of multiple correlation coefficient in both analyses is .01). Referring once again to Table 4, the control DO's had a higher reported rate of QRB use in two of the three office pairs.

Several points are worth making about these findings. First, the reported daily use of job reference materials appeared quite low, especially considering that the enumerators were inexperienced. A concern must be expressed that manual design may be an important factor only in training when enumerators are learning the job, since there may be a strong bias against using job reference materials once the actual enumeration begins. If this bias does exist, then when training is designed, the assumption cannot be made that briefly covering a topic in training is adequate since the enumerator would have a manual to refer to on the job. Instead, a more reasonable assumption might be that, if a skill or knowledge is considered crucial to correct job performance, every effort must be made to ensure that it is mastered before the enumerator leaves training.

Second, although the rate of QRB use in a JPA office was lower than its control office in two of the three office pairs, the job aid manual contained some of the QRB information that was expected to be used most frequently (i.e., the age conversion table and table of residency rules). Accordingly, JPA-trained enumerators in certain cases could have used the job aid manual instead of the QRB.

Finally, the differences in reported rates of manual use, although statistically significant, would not appear to be of any practical significance.

Cumulative Number of Questionnaires Completed by An Enumerator After Three Days of Work in Followup 1

As part of progress reporting for followup 1, enumerators were supposed to contact their crew leader on a daily basis and report the number of nonresponse questionnaires they had completed. This count was obviously a gross measure of production since the count was unverified and none of the questionnaires had gone through an edit.

Cumulative production after the first 3 days of work was of interest because crew leaders should have conducted a first review after that period of time. Accordingly, this review was expected to eliminate any performance problems through either retraining or release of the enumerator. The mean cumulative production rates for the JPA and control offices are presented in Table 5.

TABLE 5

Average Cumulative Production Figures After 3 Days of Work

	Mean	Stan. Dev.
JPA	24.9	16.4
Control	27.2	18.3

These figures are notable because in both groups production was far below precensus expectations. Specifically, enumerators were told that they were expected to complete at least 16 nonresponse cases per 8-hour day, or 14 acceptable cases (including short and long forms)[3] per 8-hour day to earn targeted hourly wages. Obviously, neither group approached the expected average production of 48 cases, and it also seems likely that few piece-rate enumerators were earning the targeted wage, at least for the first few days of followup 1.

Before analyses of the figures in Table 5 are described, several possible covariates that might have affected production will be discussed in turn. These factors include different methods of paying enumerators, time of training, and selection test scores.

Shortly after the start of followup 1, field problems occurred in all participating district offices. Apparently, the most serious of these problems concerned errors in the Master Address Registers. For example, enumerators complained about duplicate listings, nonexistent housing, and delays in processing late mail returns. These errors took time to find and correct and some district offices switched their enumerators from piece-rate to hourly wages in order to deal with resulting attrition and morale problems.[4] Unfortunately for the purposes of this study, different pay scales could introduce a serious confounding variable. Therefore, in an attempt to determine if method of payment differed between training groups, data-capture clerks in each of the offices were instructed to record how an enumerator was paid, but the only information that could be obtained was whether or not an enumerator worked on an hourly pay scale at any time during followup 1. The percentage of enumerators who were paid an hourly wage at any time during followup 1 is reported in Table 6 for each district office. The data clearly show that district offices differed substantially in their reported use of hourly enumerators during followup 1.

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[3] D-548, Followup 1 Enumerator's Manual (Decentralized), p. 112.

[4] Even prior to these problems it was not planned for all enumerators to be paid piece-rate. Because of special circumstances in some enumeration districts, enumerators who worked in them were paid an hourly wage.

TABLE 6

Percentage of Enumerators Who Were Paid Hourly at Any Time During Followup 1

District Office	Percent
W. Queens	0.0
Pittsburgh West	37.4
S. Dayton	28.7
Average for JPA	24.0
S.W. Brooklyn	0.4
Pittsburgh East	17.6
W. Columbus	49.0
Average for Control	22.0

One possible reason for problems in the address registers cited by several crew leaders was that followup 1 started too soon in some offices; that is, it started before all late mail returns had been checked into the district office and their status changed from nonresponse to response in the address register.[5] Assuming, due to delays in questionnaire check-in, the presence of a large number of incorrectly identified nonresponse addresses in an address register, two different effects on production can be hypothesized. First, since enumerators were told to complete a questionnaire - even though the respondent might claim to have mailed one in already - production might have been boosted since there would have been an inordinate number of nonresponse addresses available. However, another possibility was that enumerators would grow tired of confronting respondents who already claimed to have mailed in a questionnaire and, instead, would target those households for a return visit later in followup 1 when more mail returns had been processed. In this case, production would be lowered because visits to incorrectly identified nonresponse addresses would not contribute either to production or an enumerator's pay. In light of the production figures reported in Table 5, it seems that this latter hypothesis is better supported.

As mentioned previously, two other variables that might also have affected production were time of training and selection test scores. As noted in PERM No. 9, not all offices trained their followup 1 enumerators on the same dates (see Table 2 in Appendix A in PERM No. 9). Therefore, it is likely that the more training was delayed, the less severe the questionnaire check-in problem would have been.

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[5] Because of the larger than expected mail response, questionnaire check-in in the district offices fell behind schedule.

Finally, although an attempt was made to match office pairs for this study, local differences could be expected to affect both the availability and quality of the work force that was recruited. Table 7 provides a breakdown which compares offices on the average selection test scores of their followup 1 enumerators.

TABLE 7

Mean of Enumerator Selection Test Scores* by District Office

District Office	Mean	Stan. Dev.
W. Queens	36.0	8.4
Pittsburgh West	37.7	8.4
S. Dayton	38.8	8.1
Average for JPA	37.6	8.3
S.W. Brooklyn	35.1	8.8
Pittsburgh East	38.7	8.4
W. Columbus	38.6	8.4
Average for Control	37.4	8.7

* Maximum score is 54.

To determine if the mean difference in Table 5 (which favored the control group) was statistically significant, average production scores for the JPA and control groups were compared using regression analysis to analyze the nested ANOVA design described earlier, except that training date and selection test scores were separately introduced as covariates.[6] Tables F.1 and F.2 in the appendix present the results of these analyses. In all cases, the covariates were entered first in the regression model, followed by dummy variables for training approach and district office (district office was nested under type of training).

Across all the models analyzed, method of training had the largest effect accounting for approximately three percent of the total variance after the covariate had been partialed out. As expected, selection test scores had a positive, but small, effect on production. Table G in the appendix presents a breakdown of these production figures by district office. Except for the S. Dayton - W. Columbus pairing, control office production in each case exceeded that in the matched JPA office.

Quality Control Enumerator Progress Report (Form D-170)

Instead of the office edit of nonresponse questionnaires that occurred in centralized district offices, nonresponse questionnaires in decentralized offices were reviewed by Quality Control enumerators. This edit by QC enumerators was essentially a check for last resort[7] information, plus some additional information required on long-form questionnaires. Therefore, the QC enumerator's report included an assessment of a minimal level of quality for enumerator-filled questionnaires. Each QC enumerator was supposed to review on alternate days, the work produced by two different crews of enumerators.

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[6] Introducing more than one covariate resulted in a trivial increase in the multiple correlation coefficient. Method of enumerator pay could not be used as a covariate because the exact time an enumerator was converted from piece-rate to hourly was not known in all cases.

[7] Last Resort information referred to a minimum number of population and housing items that needed to be filled for a questionnaire to be considered "acceptable." For example, on the short form it was the name of each person, plus at least 3 of the following 4 population questions: relationship, sex, race, and marital status. The required housing items were: number of living quarters, method of entering living quarters, plumbing facilities, and value of and commercial or medical use of one-family houses.

For the purposes of this study, the first two reports filed for a crew leader during followup 1 were used for analysis. Table 8 presents the mean production figures for the JPA and control groups for the first two QC reports. Breakdowns of these tables by district office are provided in Tables G.2 and G.3 of the appendix.

TABLE 8

Average Number of Acceptable Questionnaires Reported
On the QC Enumerator Reports

	Time 1		Time 2	
	Mean	Stan. Dev.	Mean	Stan. Dev.
JPA	17.0	15.6	19.2	16.7
Control	22.2	17.5	23.6	18.5

To determine if these mean differences were significantly different on the two occasions, the analysis described in the previous section was repeated. Tables H.1 and H.2 in the appendix present the results of these analyses for the first QC enumerator report; Tables I.1 and I.2 present the results for the second QC enumerator report.

Consistent with the analysis of the cumulative production data (Tables F.1 and F.2), on both QC enumerator reports JPA-trained enumerators produced fewer "acceptable" questionnaires than their counterparts in the control offices. Also consistent with the results for the cumulative production data, higher selection test scores tended to result in greater numbers of "acceptable" questionnaires on both reports. However, contrary to the analysis of the cumulative production data, individual district offices contributed significantly to a reduction in residual variance in both analyses. Finally, the later an enumerator was trained had no significant effect for the first QC report, but consistent with the cumulative production data, later training dates tended to result in fewer numbers of "acceptable" questionnaires produced on the second QC report.

Although there is definitely a consistent pattern to the results obtained for the quantitative production measures used in this study, several facts affect the generalizability of the results. First, together the explanatory design variables and covariates explain relatively little (4-12 percent) of the total variation present in the dependent variables, which were basically gross measures of production. Moreover, the large sample sizes of enumerators used contributed to finding statistically significant differences, but determining practical significance is a more complicated issue that must consider a variety of other factors (e.g., additional followup required, quality of the data, coverage, and costs of enumerator attrition).

Second, almost all the production measures used had high rates of missing data, particularly in the control offices, which could have introduced a systematic bias into the results. One possible explanation for these response differences between the JPA and control offices was that Field Operations Assistants (FOA's) in the JPA offices were aware of differences in the training materials being evaluated and expended more effort than their counterparts in the control offices to assist the evaluation by ensuring, for example, that crew leaders conducted first reviews and turned in the results. Failure to conduct an equivalent proportion of first reviews in the control offices could have resulted in artificially inflated production scores since enumerator errors would have gone undetected and questionnaires accepted that otherwise might have required additional followup. The review by the QC enumerator would not have rectified this situation since this check was basically only for Last Resort information.

Third, considering the small number of district offices sampled, field problems (e.g., problems with the address registers) might have been worse in one group (JPA or Control) as opposed to the other. Problems with address registers, for example, definitely lowered initial production scores because enumerators were often required to follow up addresses that either were duplicates or had already mailed in a questionnaire. Unfortunately, no data were collected on the differential severity of field problems in the JPA and control offices, so no comparisons are possible.

Record of First Review (D-185)

The Record of First Review was a crew leader's first quality check of an enumerator's work and involved an examination of entries in the Master Address Register (Part A) and an edit of five randomly selected questionnaires (3 short forms and 2 long forms, see last page of appendix for an example of a D-185) to check for improperly answered or skipped questions.

Part A of the Record of First Review provided no specific instructions for evaluating an enumerator's work. If a crew leader thought that performance was acceptable, the "Yes" column was marked for a given job task. If performance was not considered acceptable, the crew leader was instructed to retrain the enumerator and circle the "X" in the "No" column to indicate that the enumerator understood the correct procedure. Overall results for Part A were recorded in the Results box on the front page of the D-185, Record of First Review.

Part B of the Record of First Review was essentially a tally sheet for errors found on the short or long forms. If more than 4 errors were found for a sample of five questionnaires, the crew leader was supposed to schedule another First Review. If there were more than 20 errors, the crew leader was supposed to instruct the enumerator to stop working until the situation was discussed with the FOA and a decision made to retain or release the enumerator.

An analysis of the number of "No" boxes checked on the front of the D-185 indicated little difference between the JPA and control groups. On an average, 0.3 boxes (out of a possible total of 6) were checked per enumerator in both groups. Table 9 presents the results of a crew leader's overall evaluation of an enumerator's work based on a review of the items on the front page of the D-185. Evaluation results for enumerators did not differ significantly between the JPA and control groups. Slightly over 5% of the enumerators in the JPA group and 7% of the enumerators in the control group failed Part A of First Review.

TABLE 9

Results of Crew Leader Evaluations Based on a General Review of the Master Address Register and Questionnaires

	(N=916) JPA	(N=936) Control
Satisfactory	94.8%	92.7%
Needs Improvement	4.6	5.8
Unsatisfactory	0.7	1.5

Table J in the appendix presents a breakdown of Table 9 by district office. This table is notable because, compared with other measures used in this study, there is little between-office variation.

The average number of short-form and long-form errors found during the crew leader's edit of 5 randomly selected questionnaires is reported in Table 10.

TABLE 10

Average Number of Edit Errors Reported by Crew Leaders During First Review

	JPA	Stan. Dev.	Control	Stan. Dev.
Short-Form Errors	1.1	2.0	1.1	1.8
Long-Form Errors	1.1	2.1	1.0	1.6

Although crew leaders were not required to do a detailed edit, the average number of errors reported seems so low that concern must be expressed about the validity of the figures. For example, based on edit results after the Oakland pretest,[8] average NA rates per questionnaire (items not completed that should have been) of 4.7 items for short forms and 44.6 items for long forms were reported.

Table 11 presents the overall results for the crew leader edit during First Review. As noted in the table, slightly over 10% of the enumerators in each group failed Part B of First Review. Only 3.2% of the enumerators in both the JPA and control groups failed both Part A and Part B of First Review.

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[8] Figures supplied by Richard Griffin (SMD) were based on enumerator-filled, occupied housing units.

TABLE 11

Results of Crew Leader Edit of a Sample of Short and Long Forms

	(N=922) JPA	(N=916) Control
Satisfactory (0-4 errors)	89.7%	89.8%
Needs Improvement (5-20 errors)	9.5	9.5
Unsatisfactory (more than 20 errors)	0.8	0.7

Table K in the appendix presents a breakdown of Table 11 by district office. Unlike the results in Table J, there is more between-office variation with the Pittsburgh West office failing proportionally more enumerators than any of the other offices. It is possible that this aberration was caused by a unique field problem in that district office; specifically, approximately 17-20% of the original nonresponse cases in the office were actually late mail returns that the U.S. Postal Service failed to deliver until April 23, 1980 - a week after the start of followup 1. If enumerators attempted to obtain completed questionnaires from these addresses, it is likely that more resistance would have been encountered from respondents which could have resulted in a greater number of incompletely filled questionnaires. Accordingly, proportionally more enumerators would have failed First Review.

Record of Reinterview, Form D-158

Completing the Record of Reinterview required a crew leader to select a random sample of five completed nonresponse questionnaires for each enumerator and to telephone, if possible, the household to verify the household roster and address. However, this procedure, more than any other, was resisted by crew leaders and in several offices was done for only about 20% of the enumerators (see Table A in appendix). For example, three Field Operations Assistants (FOA's) provided personal letters explaining the lack of D-158's, Record of Reinterview, from their office. Reasons given for not completing the form were that followup 1 failed to start on schedule, or started in a piecemeal fashion with enumerators going into the field at different times. Because of the delays and pressure to get work into and out of the field, crew leaders reportedly did not have time to conduct the reinterview. In fact, one FOA suggested that the QC enumerator should have had this responsibility. Moreover, when the reinterview was attempted, the crew leaders reported resistance and even hostility from respondents who had reportedly mailed in their questionnaire, but were visited, sometimes more than once, by followup enumerators because of errors in the address registers. Crew leaders also reported that some respondents did not like to give information over the telephone and were suspicious of the crew leader's authority. Finally, other crew leaders disliked the reinterview procedure because they felt that it put them in the position of having to question the integrity of their enumerators. However valid those complaints might have been, the Record of Reinterview did have the highest rate of missing data, ranging from 49.7% in W. Queens to 80.6% in W. Columbus.

Another problem with the Record of Reinterview was that there was reason to believe that procedures were not correctly followed even when it was completed. For example, enumerators who failed the reinterview should have been reinterviewed again with a new sample of questionnaires, but this apparently did not happen as often as required.

On the average, 3 enumerators out of 100 failed reinterview in the JPA offices versus 5 out of 100 in the control group. Table L in the appendix reports the percentage of enumerators in each office classified by the number of questionnaires for each enumerator found to have household listing errors. Based on these results, it is estimated that the reinterview procedure identified 41 questionnaires across all six district offices that had household member listing errors. No attempt was made to estimate within-household coverage error.

Other Variables of Interest

The performance measures discussed so far were selected because of their temporal proximity to training. Beyond a given point in the followup period, it was assumed that factors such as on-the-job training by supervisors, attrition or release of less productive or unmotivated workers, and other factors (e.g., quality of supervision) unique to district offices would obscure the effects of training, particularly because the performance measures used were only gross measures of production and quality. Still, they were the management tools used to judge the progress of the census.

Definitely more removed from training, but probably indirectly affected by it, were other measures of a successful operation such as enumerator attrition and final closing dates for an office. Although no definitive conclusions can be made about these measures, patterns of results may emerge that either support or contradict earlier findings. For example, the percentage of enumerators who completed their assignments, the end of followup 1 in each office, the closing date of each office, and unemployment statistics for March - May 1980, are shown in Table 12.

TABLE 12

Percentage of Enumerators Completing Their Assignments, DO Closing Dates, and Unemployment Statistics

	JPA	Percent	End of FU 1	Closing Date	Percent Unemployed March	April	May
a.	W. Queens	41.1%	July 3	Oct. 16	8.8	7.5	8.4
b.	Pittsburgh West	74.0	May 14	Aug. 22	7.0	6.4	6.5
c.	S. Dayton	71.2	May 23	Aug. 26	6.3	6.8	8.0
	Average	62.7					
	Control						
a.	S.W. Brooklyn	55.0	June 21	Sep. 26	8.8	7.5	8.4
b.	Pittsburgh East	58.9	May 30	Sep. 5	7.0	6.4	6.5
c.	W. Columbus	54.2	May 20	Sep. 5	4.5	4.9	5.8
	Average	55.8					

Based on this table, there is obviously a relationship between the percentage of enumerators who completed their followup 1 assignments and the final closing date of a district office.[9] A significant ($p<.05$) Spearman rank correlation coefficient of 0.9 was computed (adjusted for tied ranks) for this comparison. However, it is interesting to note that similar correlations computed for the 3-day production figures and the two QC enumerator reports were not statistically significant, (correlations ranged from 0.20 to -.55) indicating that initial production figures were not related to final office closing dates. Unemployment figures reported in Table 12 bear little relationship to enumerator attrition figures. For example, Pittsburgh West retained the highest proportion of its enumerators, but its unemployment rate dropped from March - May 1980, the period of time most likely to affect employment in followup 1.

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[9] This relationship was of primary interest because the percentage of enumerators who completed their assignments in followup 1 should be an indirect measure of the quality of work accomplished. Specifically, it can be hypothesized that less interviewer turnover results in higher quality work; moreover, less turnover means greater numbers of experienced workers would be available for followup 2. Accordingly, followup 2 should be shorter in offices with less turnover in followup 1, resulting in earlier closing dates.

Table 13 presents a breakdown of enumerator attrition for the JPA and control groups. These data came from the final pay voucher filed for an enumerator during followup 1. Crew leaders were directed to enter a reason on the pay voucher explaining why the enumerator was no longer working (assignment completed, released, etc.). If a reason was not on the form, data-capture clerks were instructed to contact either the crew leader or FOA to determine the reason. Table M in the appendix presents a breakdown of these reasons by district office.

TABLE 13

Analysis of Reasons for Enumerator Separations

	(N=1140)	(N=1160)
Reason	JPA	Control
Assignment completed	62.7%	55.8%
Pay dissatisfaction	3.2	1.7
Work dissatisfaction	4.2	10.9
To take another job	7.6	6.2
Poor performance	4.9	10.7
Other	17.4	14.7

Note: Reasons for attrition were available for 96.9% of the JPA enumerators and 86.0% of the controls.

The breakdown above should be interpreted cautiously because the obtained distribution may not reflect true causes of attrition. For example, as noted in a previous report (PERM No. 9), enumerator comments about pay led the list of improvements suggested for future censuses. Moreover, inadequate pay might have caused an enumerator to look for and find alternative employment or, if the enumerator quit because of a combination of factors (one of which was pay), the action might have been interpreted as work dissatisfaction by a crew leader or FOA.

The difference in attrition between the groups in Table 13 attributable to poor performance is noteworthy, not because the difference favors the JPA group, but because the difference was caused by one control office - S.W. Brooklyn - that released approximately 20% of its enumerators because of poor performance. It might only be a coincidence, but this office also had the lowest mean selection test scores of all participating offices (see Table 7).

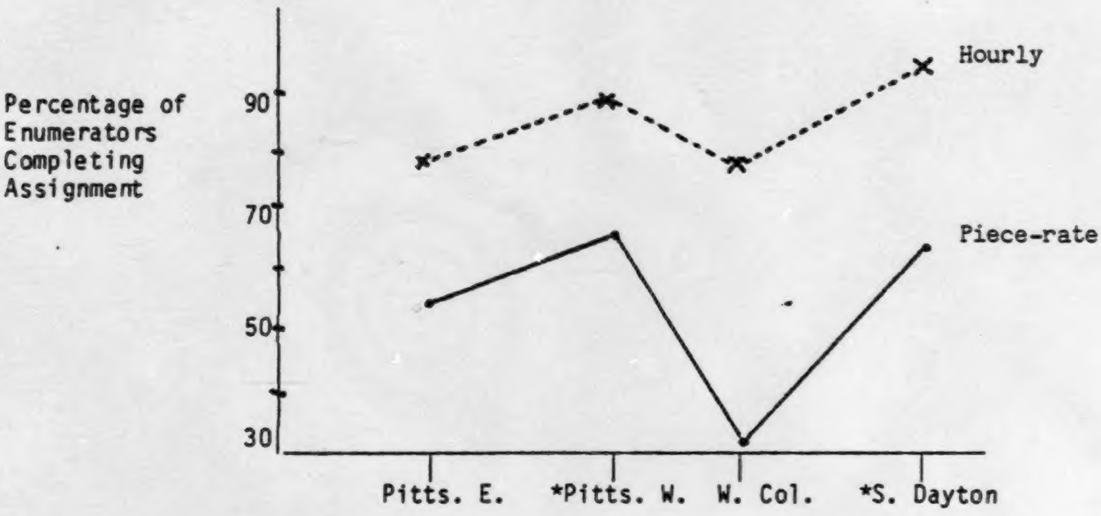
Method of Payment and Enumerator Attrition

In the first memorandum describing the results of this study (PERM No. 9), it was noted that 3 of the 4 most frequently mentioned improvements to the enumerator's job dealt with pay. Accordingly, attrition was examined controlling for method of payment. To reiterate, if an enumerator was classified as an hourly worker, it meant only that at some point during followup 1 the enumerator was paid an hourly wage. It was possible, in certain cases, that hourly enumerators actually worked most of followup 1 as piece-rate workers. Unfortunately, data on the conversion of piece-rate enumerators to hourly were collected by only one office.[10] Table N in the appendix shows the cumulative percentage of enumerators who were reappointed to hourly wages for the S. Dayton district office. Followup 1 ended in late May in this office. In this office the greatest number of reappointments to an hourly wage occurred after approximately two weeks of followup 1.

Considering this study's limitations in the definition of hourly workers, Figure A graphically compares the percentage of enumerators who completed their assignments and were paid hourly or piece-rate. Table O in the appendix presents the same data in tabular form. Two district offices were excluded because less than 1% of their followup 1 enumerators were paid hourly.

FIGURE A

Percentage of Enumerators Completing Their Assignments as a Function of Method of Payment



*JPA office

Table 14 presents a breakdown of the reasons for enumerator attrition controlling for method of payment. Chi-square comparisons for both groups were significant; i.e., $X^2 = 112.7$, 5 df, $p = 0.00$ for the JPA group, and $X^2 = 79.7$, 5 df, $p = 0.00$ for the control group.

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[10] These data were not required in original data-collection specifications.

TABLE 14

Reasons for Enumerator Separations Classified By Training Approach And Method of Payment

	JPA		Control	
	(880) PR	(260) H	(924) PR	(236) H
Assignment completed	54.5%	90.4%	50.2%	77.5%
Pay dissatisfaction	4.1	0.0	2.1	0.4
Work dissatisfaction	5.3	0.4	13.0	2.5
To take another job	9.5	1.2	5.5	8.9
Poor performance	5.7	2.3	13.0	1.7
Other	20.8	5.8	16.2	8.9

PR - Piece rate H - Hourly

In both Figure A and Table 14, proportionally more enumerators who were paid hourly completed their assignments. These results might also help explain a previous finding; specifically, the significant relationship between the percentage of enumerators who completed their assignments and the final closing date for an office. It is possible that paying enumerators an hourly wage reduced attrition which helped maintain higher uniform productivity for an office which, in turn, led to earlier closings.

Intercorrelations Among Performance Variables

In any large-scale study, the reliability and validity of measures are an important concern. In this study, both were probably most affected by crew leader and QC enumerator adherence to procedures, as well as by systematic biases that may have existed in either the JPA or control group. Although reliability and validity were not directly assessed, they can be indirectly evaluated by examining performance variables and their intercorrelations (Pearson product moment).

For example, it is reasonable to expect that production after three days and the number of questionnaires passing the first QC enumerator report should be intercorrelated since both were obtained at about the same point in followup 1. Table 15 presents the intercorrelations of many of the variables discussed in this report. The correlations cannot be directly compared since they are based on different cases due to patterns of missing data.

TABLE 15a.

Intercorrelations Among Performance Variables, Selection Test Scores, and Final Review Test Scores for the JPA Group

	Selection Test	Final Review Test	3-Day Production	First D-170	Second D-170
Selection Test		0.45	0.10	0.06*	0.10
Final Review Test			0.09	0.14	0.08
3-Day Production				0.42	0.32
First D-170					0.35

* Not significant, p<.05

TABLE 15b.

Intercorrelations Among Performance Variables, Selection Test Scores, and Final Review Test Scores for the Control Group

	Selection Test	Final Review Test	3-Day Production	First D-170	Second D-170
Selection Test		0.43	0.11	0.09	0.08
Final Review Test			0.09	0.12	0.08
3-Day Production				0.51	0.40
First D-170					0.28

As expected, cumulative enumerator production after 3 days of work was positively and moderately correlated with the number of questionnaires that passed the first QC enumerator edit. The correlation was 0.42 in the JPA group and 0.51 in the control. Likewise, positive, but lower correlations were found between cumulative production after three days and the number of questionnaires that passed the second QC enumerator edit. Contrary to expectations, the first and second QC enumerator reports were not highly correlated. Correlations ranged from 0.28 in the control group to 0.35 in the JPA group.

In both groups, selection test scores were moderately correlated with scores on the final review tests used in training, but correlations with the three production measures were weak and, in the JPA group, one (with the first QC enumerator report) was nonsignificant. Similarly, scores on the two final review exercises used in training were only weakly correlated with the production measures.

Although almost all the intercorrelations in Table 14 are significant, many are so low as to be of no practical significance. Especially bothersome are the weak relationships found between the aptitude and knowledge measures - i.e., the selection test scores and review test scores - and the three production measures. Moreover, the three production measures are, at best, only moderately intercorrelated which raises concern about their validity. Several possible interpretations exist to explain these results.

First, it could be argued that the content of the selection test and final review test lacked relevance to the enumerator's job and factors important for success. However, a second interpretation is that the performance measures were, at best, only imperfect measures of performance that were insensitive to differences in the quality of an enumerator's work and bore little relationship to the extent of followup work required before a district office could be closed. The nonsignificant correlations reported earlier between the three production measures and district office closing dates tend to support this argument.

A third possibility, at least for correlations involving the review test, is that correlations were lowered by a restriction of range on the test scores. For example, an average enumerator got 87% of the test items correct in the JPA group and 90% correct in the control group.

Finally, it is likely that much of the variability in the three production measures was either of a random nature or due to factors unrelated to training quality or the individual attributes of an enumerator. For example, assuming a large number of duplicate addresses or unprocessed late mail returns in a Master Address Register - common occurences in many offices at the start of followup 1 - by chance alone an enumerator could have visited an inordinately large number of problem addresses during either of the sequential 2-day periods that served as input for the QC enumerator reports. Accordingly, large performance differences could have resulted between the first and second QC enumerator reports.

Unfortunately, for the purposes of this study, the period of time of most interest in followup 1 for assessing the effects of different training approaches was also the period most plagued by field problems that confounded comparisons between the JPA and control groups and, therefore, preclude making any definitive statements about the effects of alternative training on enumerator performance.

Recommendations

As noted in the first memorandum describing the results of this study (PERM No.9), the primary purpose of the Alternative Training Experiment was to develop a method of training that incorporated the advantages of verbatim training, but that eliminated most of the disadvantages. Accordingly, an attempt was made - primarily through the use of job aids - to simplify the presentation of procedural information in both the enumerator field manual and accompanying training. However, contrary to standard census reference material, the job aid manual used in this study was designed to be an integral part of training, so much so, in fact, that it would have been difficult to use if an enumerator had not gone through formal training. In addition, training activities were designed concurrently with the job aid manual to reduce the amount of lecture and increase trainee participation, to introduce a variety of learning activities (e.g., workbook exercises, practice interviewing, audiovisuals, problem solving) for combating monotony and boredom, and to use performance checks (e.g., quizzes, discussion periods, exercises, formal review test) that enabled the trainer to monitor the learning process and ensure that all trainees left training with at least a minimum set of knowledge and skills.

The success of the alternative training in achieving some of these objectives was clear-cut. The standard enumerator field procedures manual was shortened from 129 to 62 pages and used for instructional purposes in training that were not practical with the standard manual. Moreover, enumerator evaluations of the training favored the alternative training on measures such as quality, comprehensibility of training materials, and length of training. This study, therefore, demonstrated that census manuals and accompanying training could be significantly simplified without major increases in training costs and using existing Bureau facilities. However, the attainment of other objectives was less clear. For example, this study did not demonstrate that better enumerator reactions to training translated to higher quality performance or production. In fact, production measures, acknowledging problems with them, tended to favor the standard census training.

Although no definitive statements about the effects of training on performance can result from this study, several suggestions for training development and research are presented based on experiences garnered during the course of this experiment. They are:

1. More preparation time is required for experiments of this nature. Further, small-scale experimentation with alternative training methods should proceed prior to large-scale field experimentation.

    a. In line with this recommendation, efforts should be continued to investigate alternatives or supplements to verbatim training.

b. Also, experimental comparisons of training alternatives could take place during census pretests. Dress rehearsals could further be used to refine existing training packages and to deal with unforeseen problems.

2. All decennial training packages should be designed with at least two hours of flexible time.[11] This time could then be used to deal with both unforeseen field problems and situations unique to certain district offices (e.g., large numbers of seasonal units, large apartment complexes with poorly marked units, etc.). It was disconcerting to read in a 1970 evaluation report[12] that problems most frequently cited by enumerators were mistakes in the address registers, uncooperative people, and respondents saying that a questionnaire had been mailed in. These same problems also occurred frequently in the 1980 Census which leads to the next recommendation.

3. Training packages should present a more realistic picture of the work situation.[11] Both training approaches in this study presented an idealistic picture of an enumerator's work. Accordingly, both failed to prepare enumerators for the prevalent problems resulting from incomplete and mixed-up address registers. Carefully structured training which assumes correctly prepared materials may be counterproductive and lead to worker cynicism and distrust about the integrity and competence of training when the work situation is not as described or taught.

4. The design of training and field procedures manuals should be an integrated effort. Ideally, the same person would write both the manual and the training guide, but these functions could be separated if a formal means of communication was established and all manuals (including the QRB and administrative manuals) could be revised after training "dry runs" or tests to see if people learned the skills being taught.

5. A structured approach (i.e., the JPA model) should be used to prepare all training materials.

6. Persons responsible for developing procedures should attempt to present them in a job aid format. Or, procedures could be given to technical specialists who would rewrite them in a job aid format. This recommendation necessarily applies only to procedures suitable for such a format.

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[11] These recommendations were originally suggested by Donny Rothwell.

[12] Inderfurth, Gail. Results from the 1970 Enumerator Variance Study Post-Enumeration Questionnaire. E18 No. 40

7. All procedures should receive input from training specialists as to their trainability given time, monetary, and other constraints. Additional input from field specialists would also be required to determine if procedures, as written, could be successfully implemented in the field.

8. To the maximum extent possible, manuals used in decennial training should be consolidated, integrated into the training, or both. For example, there was no apparent reason why an administrative manual was required for decennial followup 1 enumerators. Such a manual was totally excluded from the alternative training, yet JPA enumerators reported fewer problems filling payroll (See PERM No. 9) forms than control enumerators.

Finally a point that should be reiterated is that it was not the job aids alone which resulted in the differences in enumerator reactions found in this study. Of more importance was the process used to produce the job aids which avoided many of the bureaucratic roadblocks to communication present in the production of standard census training. It is likely that a different person, or group of persons, would have produced somewhat different job aids, but as long as the accompanying training was developed concurrently, effective training should have resulted.

Bureaucratic divisions of labor created communication problems because in the planning and conduct of a census procedures changed frequently, were sometimes left vague, or were poorly understood by the writers responsible for designing training. Moreover, training specialists often observed awkward, difficult-to-teach, or nonproductive procedures which were difficult to modify because the originator of the idea was several levels removed in the bureaucracy. Job-performance-aided training deals effectively only with the communication problems that occur in the preparation of manuals and training. As noted in recommendation 7, other channels need to be established so that feedback from writers about the trainability of procedures will also be considered.

APPENDIX

TABLE A

Percentage of Enumerators in Each District Office with Usable Performance Data

	District Office	No. Completing Training	Self-Report E Perf	Self-Report Manual Use	Self-Report QRB Use	Rev.Test Score	Prod after 3 Days	D-170(1)	D-170(2)
a.	W. Queens1/	372	*100.0%	*100.0%	*100.0%	78.2%	94.6%	89.0%	80.1%
b.	Pittsburgh W.	324	48.8	47.8	47.8	80.6	92.9	91.7	77.8
c.	S. Dayton	459	80.2	78.0	78.0	98.7	90.6	80.4	79.5
a.	S.W. Brooklyn2/	449	26.7	26.1	26.1	99.1	92.7	96.4	72.6
b.	Pittsburgh E.	310	69.4	69.0	69.0	87.4	71.9	77.1	58.4
c.	W. Columbus	516	41.5	39.0	39.0	68.0	98.3	39.7	36.4

1/ JPA district offices

2/ Control district offices

* These figures were inflated by clerical error because clerks failed to record the names of all enumerators who had completed training which provided the base reported in column 2 (No. completing training). Since the self-report measures came from the anonymous post-training questionnaire, it was not possible to determine which enumerators actually completed the measures. For the other evaluation measures shown in this table, it was possible to link a name with a performance figure.

TABLE A (Cont'd.)

Percentage of Enumerators in Each District Office with Usable Performance Data

	District Office	First Review	Reinterview
a.	W. Queens[1]	82.8%	50.3%
b.	Pittsburgh W.	68.8	22.5
c.	S. Dayton	83.9	36.6
a.	S.W. Brooklyn[2]	73.3	52.1
b.	Pittsburgh E.	62.3	20.0
c.	W. Columbus	80.2	19.4

a - Pair 1
b - Pair 2
c - Pair 3

[1] JPA district offices

[2] Control district offices

TABLE B

a. Analysis of Variance for JPA Final Review Tests

Source	df	Sum of Squares	Mean Square	F	p
Between	2	26.7	13.36	.57	.57
Within	249	5822.5	23.38		
TOTAL	251	5849.2			

b. Analysis of Variance for Control Final Review Tests

Source	df	Sum of Squares	Mean Square	F	p
Between	2	94.4	46.19	8.51	.0003 1/
Within	249	1352.1	5.43		
TOTAL	251	1444.5			

1/ Using the Scheffe post-test procedure, average scores in the S.W. Brooklyn district office were found to be significantly lower (p< .05) than the other two.

TABLE C

District Office Comparisons for Self-Reported Job Performance

Question: "How would you rate your own job performance so far?"

	(N=375) *W. Queens	(N=120) S.W. Brooklyn	(N=158) *Pittsburgh W.	(N=215) Pittsburgh E.	(N=368) *S. Dayton	(N=214) W. Columbus
Very Good	41.1%	32.5%	50.0%	31.2%	28.3%	39.7%
Good	49.1	51.7	44.9	56.7	59.0	53.7
Fair	8.5	15.0	5.1	10.7	12.2	6.5
Poor	1.3	0.8	0.0	1.4	0.5	0.0

* JPA district office

TABLE D

Analysis-of-Variance Table (Nested Design) for Manual Use

Source	df	Sum of Squares	Mean Square	F
Training Approach	1	20.2	20.2	5.13*
District Offices	4	200.1	50.9	12.70*
Residual	1431	5612.7	3.9	

* $p < .05$

$R^2 = 0.04$

TABLE D.1

Analysis-of-Variance Table (Nested Design) for QRB Use

Source	df	Sum of Squares	Mean Square	F
Training Approach	1	19.1	19.1	7.17*
District Offices	4	27.5	6.9	2.58
Residual	1431	3795.3	2.7	

* $p < .05$

$R^2 = 0.01$

TABLE E

Analysis-of-Variance for Manual Use Assuming Equivalence of JPA and Control Offices in Matched Pairs

Source	df	Sum of Squares	Mean Square	F	Significance
Main Effects	3	167.2	55.7	14.1	.000
District Office	2	146.9	73.5	18.7	.000
Training Approach	1	25.7	25.7	6.5	.011
Interaction	2	52.3	26.1	6.6	.001
Explained	5	219.5	43.9	11.1	.000
Residual	1425	5613.5	3.9		

TABLE E.1

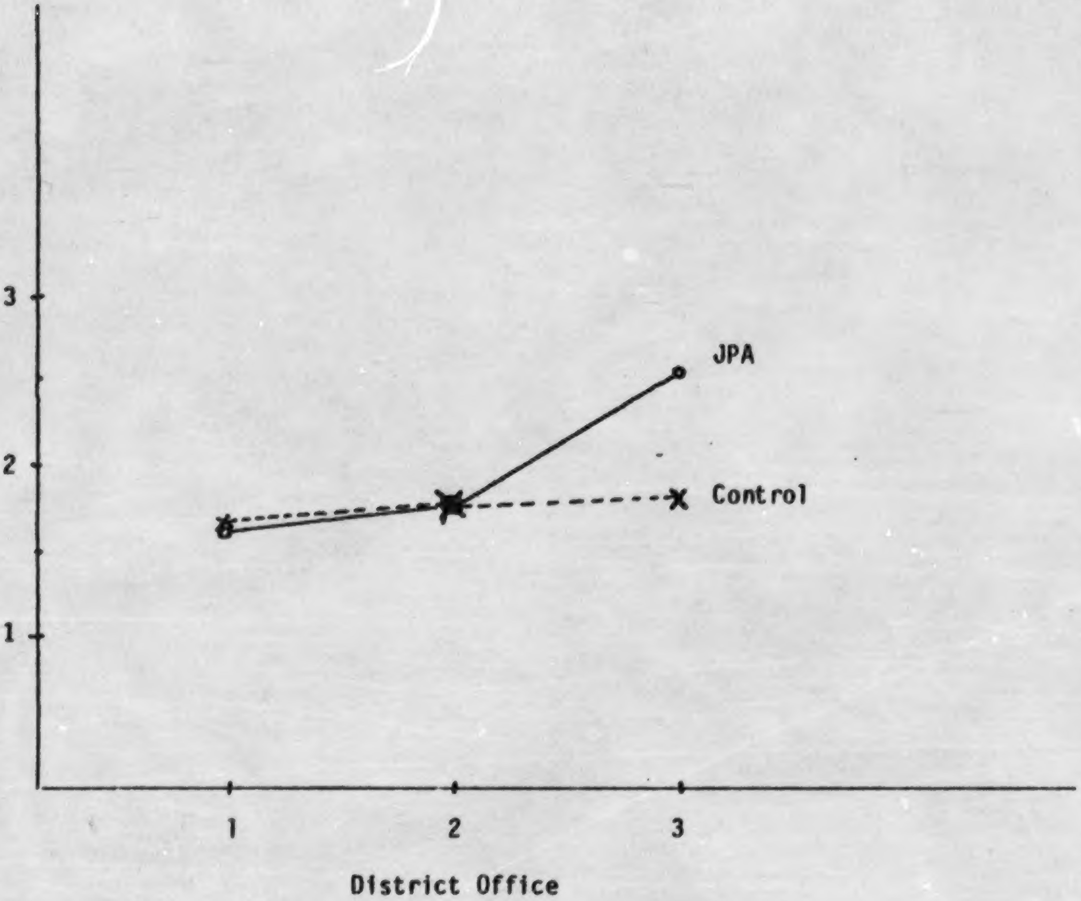
Analysis-of-Variance for QRB Use Assuming Equivalence of JPA and Control Offices in Matched Pairs

Source	df	Sum of Squares	Mean Square	F	Significance
Main Effects	3	28.0	9.3	3.5	.015
District Office	2	8.9	4.4	1.7	.189
Training Approach	1	20.4	20.4	7.7	.006
Interaction	2	18.6	9.3	3.5	.031
Explained	5	46.6	9.3	3.5	.004
Residual	1425	3795.3	2.7		

$R^2 = 0.01$

Figure 1.

Mean Reported Manual Use Assuming
Equivalence of JPA and Control Offices in Matched Pairs



District Office
1 - W. Queens and S.W. Brooklyn
2 - Pittsburgh W. and Pittsburgh E.
3 - S. Dayton and W. Columbus

TABLE F.1

Analysis-of-Covariance Table for Production
(Selection Test Score as Covariate)

Source	df	SS	MS	F	Beta	R^2 Change
Selection Test	1	1,933.9	1,933.9	7.4*	.073	.005
Training Approach	1	11,407.7	11,407.7	43.4*	-.055	.032
District Office	4	2,683.6	670.9	2.6		.008
Residual	1,294	340,121.5	262.8			

$R^2 = .05$, * $p < .05$

TABLE F.2

Analysis-of-Covariance Table for Production
(Training Date as Covariate)

Source	df	SS	MS	F	Beta	R^2 Change
Training Date	1	1,831.7	1,831.7	6.9*	-.050	.005
Training Approach	1	11,348.4	11,348.4	43.0*	-.095	.032
District Office	4	1,639.8	410.0	1.6		.005
Residual	1,294	341,326.7	263.8			

$R^2 = .04$, * $p < .05$

TABLE G.1

District Office Comparisons of Average Production After 3 Working Days

	District Office	Mean	Stan Dev
a.	W. Queens	22.0	17.5
b.	Pittsburgh West	25.3	16.1
c.	S. Dayton	27.1	15.3
a.	S.W. Brooklyn	28.3	19.1
b.	Pittsburgh East	31.6	17.1
c.	W. Columbus	24.4	17.6

TABLE G.2

District Office Comparisons of Performance On First QC Enumerator Report

	District Office	Mean	Stan Dev
a.	W. Queens	20.3	15.8
b.	Pittsburgh West	20.2	15.4
c.	S. Dayton	11.6	13.9
a.	S.W. Brooklyn	22.3	17.5
b.	Pittsburgh East	27.5	19.3
c.	W. Columbus	15.9	12.9

TABLE G.3

District Office Comparisons of Performance On Second QC Enumerator Report

	District Office	Mean	Stan Dev
a.	W. Queens	23.9	16.4
b.	Pittsburgh West	19.7	15.9
c.	S. Dayton	15.0	16.4
a.	S.W. Brooklyn	23.1	17.8
b.	Pittsburgh East	30.4	21.9
c.	W. Columbus	17.9	13.3

TABLE H.1

Analysis-of-Covariance Table for the First QC Enumerator Report in Followup 1 (Selection Test Score as Covariate)

Source	df	SS	MS	F	Beta	R^2 Change
Selection Test Score	1	2,429.6	2,429.6	10.7*	.099	.007
Training Approach	1	11,922.7	11,922.7	52.6*	-.110	.035
District Office	4	29,529.9	7,382.5	32.6*		.088
Residual	1,294	293,104.6	226.5			

$R^2 = 0.13$, * $p < .05$

TABLE H.2

Analysis-of-Covariance Table for the First QC Enumerator Report in Followup 1 (Training Date as Covariate)

Source	df	SS	MS	F	Beta	R^2 Change
Training Date	1	619.3	619.3	2.7	.033	.002
Training Approach	1	11,691.7	11,691.7	51.1*	-.074	.035
District Office	4	28,594.3	7,148.6	31.2*		.085
Residual	1,294	296,081.5	228.8			

$R^2 = 0.12$ * $p < .05$

TABLE I.1

Analysis-of-Covariance Table for the Second QC Enumerator Report in Followup 1 (Selection Test Score as Covariate)

Source	df	SS	MS	F	Beta	R^2 Change
Selection Test Score	1	2,553.5	2,553.5	9.5*	.090	.007
Training Approach	1	7,676.7	7,676.7	28.5*	-.060	.020
District Office	4	26,507.7	6,626.9	24.6*		.069
Residual	1,294	348,621.5	269.4			

$R^2 = .10$ $p < .05$

TABLE I.2

Analysis-of-Covariance Table for the Second QC Enumerator Report in Followup 1 (Training Date as Covariate)

Source	df	SS	MS	F	Beta	R^2 Change
Training Date	1	2,709.5	2,709.5	10.0*	-.039	.007
Training Approach	1	7,638.3	7,638.3	28.1*	-.089	.020
District Office	4	23,795.8	5,949.0	21.9*		.062
Residual	1,294	351,215.8	271.4			

$R^2 = .09$, $p < .05$

TABLE J

District Office Comparisons for Part A Results on the Record of First Review

	(N=308) *W. Queens	(N=329) S.W. Brooklyn	(N=223) *Pittsburgh W.	(N=193) Pittsburgh E.	(N=385) *S. Dayton	(N=414) W. Columbus
Satisfactory	92.2%	90.3%	93.7%	93.8%	97.4%	94.2%
Needs Improvement	6.8	6.7	6.3	4.7	1.8	5.6
Unsatisfactory	1.0	3.0	0.0	1.6	0.8	0.2

* JPA office

TABLE K

District Office Comparisons for Part B Results on the Record of First Review

	(N=303) *W. Queens	(N=329) S.W. Brooklyn	(N=234) *Pittsburgh W.	(N=192) Pittsburgh E.	(N=385) *S. Dayton	(N=395) W. Columbus
Satisfactory (0-4 errors)	90.1%	89.1%	82.5%	89.1%	93.8%	90.9%
Needs Improvement (5-20 errors)	9.2	9.4	17.1	10.9	5.2	8.9
Unsatisfactory (More than 20 errors)	0.7	1.5	0.4	0.0	1.0	0.3

* JPA office

TABLE L

Percentage of Enumerators With Different Numbers of Questionnaires That Failed Reinterview

		(N=187) *W. Queens	(N=234) S.W. Brooklyn	(N=73) *Pittsburgh W.	(N=62) Pittsburgh E.	(N=168) *S. Dayton	(N=100) W. Columbus
Number of	0	96.3%	95.3%	97.3%	96.8%	97.0%	95.0%
questionnaires	1	3.2	3.4	2.7	3.2	1.8	3.0
failing	2	0.5	0.9	0.0	0.0	0.6	2.0
reinterview	3	0.0	0.4	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.6	0.0

*JPA office

TABLE M

District Office Comparisons of Reasons for Enumerator Separations

	(N=350) *W. Queens	(N=500) S.W. Brooklyn	(N=315) *Pittsburgh W.	(N=302) Pittsburgh E.	(N=475) *S. Dayton	(N=358) W. Columbus
Assignment completed	41.1%	55.0%	74.0%	58.9%	71.2%	54.2%
Pay dissatisfaction	9.4	0.8	0.0	3.3	0.6	1.7
Work dissatisfaction	8.6	15.4	1.6	5.0	2.7	9.5
To take another job	16.3	2.2	4.8	4.0	3.2	13.7
Poor performance	5.1	20.6	6.0	3.3	4.0	3.1
Other	19.4	6.0	13.7	25.5	18.3	17.9

* JPA office

TABLE N

Enumerator Reappointments to Hourly Pay in the S. Dayton District Office

(N=477)

	Percentage %	Cumulative %
April 14	9.2	9.2
April 21	0.8	10.0
April 28	11.5	21.5
May 5	5.5	27.0
May 12	1.5	28.5
May 19	0.0	28.5

Note: Followup 1 ended May 23 in this office.

TABLE O

Percentages of Enumerators Completing Their Assignments Classified by Training Approach and Method of Payment

	PR	H
S.W. Brook	55.0(498)	50.0(2)
*W. Queens	41.1(350)	0.0(0)
Pitts E.	54.3(245)	78.9(57)
*Pitts W.	64.6(192)	88.6(123)
W. Col.	31.5(181)	77.4(177)
*S. Dayton	62.7(338)	92.0(137)

PR - Piece Rate , H - Hourly

Note: Base of percentages is in parentheses.

FORM D-185
(8-29-79)
D-CT

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

RECORD OF FIRST REVIEW

20th Decennial Census – 1980

1. District Office name Waterloo, Iowa	Code 2799
2. Crew leader name Albert Finch	3. CLD No. 2
4. Enumerator name Terry Jay	5. ED No. 2147

General Instructions

Complete a first review for each enumerator. A first review consists of two parts: Part A, Master Address Register and Questionnaire Review and Part B, Field Quality Check (on reverse side of this form). Instructions for these reviews are in your Crew Leader Manual. After you complete the review, take the action indicated at the end of Parts A and B.

Part A – Master Address Register and Questionnaire Review

Review the Master Address Register and Questionnaires and rate the enumerator on the following aspects of the job.

Is the enumerator	*Mark (X) one*		Explanation for "No" entries
	Yes	No	
1. Using the correct form type?	X		
2. Filling out the address label correctly so that the entries in the address label agree with the entries on the Address Listing Pages?		[✓ X]	Left boxes blank
3. Entering his/her name and date and the respondent's telephone number on the back of each questionnaire?	X		
4. Making neat and legible entries on the questionnaire?		X	Some questionnaires were messy.
5. Completing columns (10) and (13) for each nonresponse case enumerated?	X		
6. Entering daily progress figures on the cover of the Master Address Register?	X		

7. Describe any differences from prescribed procedures. Also enter any general remarks you have concerning the enumerator's work.

Discuss incorrect procedures with the enumerator. Base the evaluation below on the discussions and the number of actual errors.

RESULTS	☐ SATISFACTORY	The enumerator should continue working and no additional review is necessary.
	☒ NEEDS IMPROVEMENT	The enumerator should continue working, but an additional review must be made. Arrange to meet the enumerator and review the work for all aspects marked "No" in First Review.
	☐ UNSATISFACTORY	The enumerator is unable to do the job as prescribed. Tell the enumerator to STOP working until you are able to see him/her again. Discuss the situation immediately with your supervisor.

Part B – Quality Check

Using the instructions in your Crew Leader Manual, select a sample of 5 questionnaires so that all are for occupied households and at least 2 are long forms. Review the sample questionnaires as prescribed below, note any errors in column (b), and then take the action indicated in the "Results" section.

Review of sample questionnaires (a)		Tally of errors (b)
SHORT FORMS	Make one tally each time a question or item in the following groups is blank or incomplete and requires an answer:	
	• population questions on pages 2 and 3	//
	• housing questions on page 3	
	• items in FOR CENSUS USE ONLY box on page 3	//
LONG FORMS	Make one tally each time a question or item in the following groups is blank or incomplete and requires an answer:	
	• population questions on pages 2 and 3	//
	• housing questions on page 3	/
	• items in FOR CENSUS USE ONLY box on page 3	///
	• sample housing questions on pages 4 and 5	
	• *sample population questions on pages 6–19	//// / ////
	*NOTE: If no sample population pages are completed for a person, make 5 tallies, and go on to the next page.	
	TOTAL ERRORS ⟶	19

Notify your Field Operations Assistant if the number of errors exceeds 20. Otherwise, retrain the enumerator on the questions or items where errors made. Be sure that the enumerator corrects any errors on the sample questionnaires. Enter "edited by (your initials)" below the address label of the 5 questionnaires edited.

RESULTS	☐ 0–4 errors	**Satisfactory.** No further action required.
	☒ 5–20 errors	**Needs improvement.** Schedule another review and complete a new Form D-185.
	☐ More than 20 errors	**Unsatisfactory.** The enumerator is unable to do the job as prescribed. Tell the enumerator to STOP working until you are able to see him/her again. Discuss the situation immediately with your supervisor.

FORM D-185 (8-29-76)